United States Environmental Protection Agency
Region III
Corrective Action Program

Environmental Indicator Inspection Report
For

Turbine Airfoil Designs, Inc.
1400 North Cameron Street
Harrisburg, Pennsylvania 17110

EPA ID No. PAD003010113

Prepared By

Baker

DEPT OF ENV PROTECTION
Waste Mgmt Program

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909 Elmerton Avenue
Harrisburg, PA 17110-8

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NOTE: The site visit was performed on February 3, 2010.

RCRA SITE INSPECTION REPORT

Purpose: To gather relevant information from the Turbine Airfoil Designs, Inc. (TAD) facility, in order to determine whether human exposures and groundwater releases are controlled, as per Environmental Indicator (EI) Determination forms.

Documentation Review: Prior to the site visit, Ms. Tina Entenman and Mr. JP Kumar, of Michael Baker Jr., Inc. (Baker) conducted an extensive records review of the Pennsylvania Department of Environmental Protection (PADEP) South Central Regional Office and the United States Environmental Protection Agency (USEPA) Region III Philadelphia Office files. Additional information, including a list of wastes remaining at the facility after its closure, was provided by Cycle Chem, Inc., the waste removal firm retained by NL Ventures V Cameron Limited Partnership (NL Ventures), the current property owner.

Attendees:

Name	Organization	Phone Number	E-Mail address
Mr. Tom Cramer	NL Ventures	214-292-4246	tomcramer@aicventures.com
Ms. Kami Labell	Cycle Chem	717-938-4700	klabell@cyclechem.com
Ms. Linda Houseal	PADEP	717-705-4919	lhouseal@state.pa.us
Ms. Lisa Wilt	PADEP	717-705-4910	lwilt@state.pa.us
Mr. Mark Embeck	PADEP	717-705-6642	membeck@state.pa.us
Mr. Chase Kelch	PADEP	717-705-4909	ckelch@state.pa.us
Mr. William Kosmer	PADEP	717-705-4858	wkosmer@state.pa.us
Ms. Tina Entenman	Baker	717-221-2061	tentenman@mbakercorp.com

Meeting Summary: A meeting at the TAD facility was held with the attendees noted above on February 3, 2010. TAD began manufacturing turbine engine components in 2002. As of January 10, 2010, TAD discontinued operations at this facility. The facility is currently vacant and primarily empty. However, some waste materials remain on-site. Ms. Tina Entenman and Ms. Linda Houseal presented the property owner (NL Ventures) with information regarding USEPA Region III's Corrective Action process, the Environmental Indicator Assessment Program and the legislation driving this program. Under this investigation, USEPA Region III is focusing on two interim Environmental Indicators to evaluate whether any unacceptable risk to human health and the environment is ongoing at each priority facility. The two indicators are determining if human exposures are controlled and groundwater releases are controlled. Prior to and during the site inspection, outstanding issues and discrepancies encountered in the file review summary were discussed.

The site visit continued with an overview of areas to be observed and a tour of the facility. Photographs of the site visit are presented in Appendix A: Photographs.

A. Location and Operational History of the Facility, Including all Wastes Generated at the Facility and their Management.

Site Layout and Background Information

The historical background information presented in this section was obtained from the Baseline Environmental Report (BER) prepared by Alliance Environmental Services, Inc. (AES) on behalf of TAD and NL Ventures dated September 20, 2007, and the Consent Order and Agreement (COA) entered into on July 11, 2008 between the Commonwealth of Pennsylvania Department of Environmental Protection (PADEP), TAD, and NL Ventures.

Site Layout

The subject facility is located on an 18.62-acre parcel that is developed with various improvements including the main manufacturing building, an outdoor covered hazardous and non-hazardous waste storage area, a guard shack, and aboveground storage tanks (ASTs) (Appendix B: Figure 1- Facility Location Map). The majority of the property is asphalt-paved although several grassed areas are present on the north, west, and south side of the manufacturing building. The property is bound by Paxton Creek on the east. Commercial/industrial properties bound the facility to the north and south. The facility is bound on the west by railroad tracks owned by Norfolk Southern. Consolidated Scrap Resources (CSR, formerly B. Abram and Sons Incorporated, PAD008936106), a metal, paper, and plastic recycling facility, is located directly northeast of the facility, across Paxton Creek. Residential areas are located within 0.15 miles east and 0.25 miles west of the facility.

The buildings were constructed in 1942 and 1943. Major renovations occurred at the main manufacturing building in 1987 as a result of extensive damage caused by a fire that occurred in February 1986. The main manufacturing building is a one-story steel reinforced concrete structure with brick, corrugated metal, composition shingle, and block exterior finishes. The

building contains approximately 300,000 square feet and was most recently occupied by a single tenant (TAD) who leased the facility from the current property owner, NL Ventures, until January 10, 2010. The manufacturing building includes a two-story mezzanine section along the frontage, or east side, in which the administrative office areas were formerly housed (approximately 15% of the building area). The remaining areas were utilized for manufacturing purposes. Three additional, smaller, one-story buildings (referred to as Buildings 1, 2, and 3) are situated to the south of the main building and consist of the following:

- Building 1 (approximately 750 square feet in area)
- Building 2 (approximately 1,125 square feet in area)
- Building 3 (approximately 4,000 square feet in area)

A fourth, one-story structure (Building 4; former boiler house) is located near the northwest corner of the main building and is approximately 10,000 square feet in area. An electrical substation owned and operated by PPL Electric Utilities is located outside the north end of the main manufacturing building.

During the February 2010 site visit, five ASTs were observed on-site, which included the following:

- One 250,000-gallon water tower used to supply the on-site fire suppression system
- One 2,000-gallon propane AST
- One liquid argon AST (unknown capacity)
- One liquid hydrogen AST (unknown capacity)
- One 5,000-gallon waste oil tank

Access to the facility is via Calder Street. The facility is surrounded by a chainlink fence and barbed wire. Entry to the facility is via the locked gate with electronic key access located on the west side of Paxton Creek.

Site Ownership

According to the deeds record conducted by AES at the Dauphin County Clerk's Office and summarized in the BER (AES, 2007) the property was owned by the following entities:

- The Harrisburg Steel Corporation (HSC) owned the property from 1916 to 1942.

- The Defense Plant Corporation (DPC) purchased 23.86-acres of property from the Harrisburg Steel Corporation (HSC) in 1943.
- The Commonwealth of Pennsylvania purchased the property from the Reconstruction Finance Corporation - War Assets Administration (the successor to DPC) in 1949 and historically leased out the properties. The Commonwealth of Pennsylvania ultimately subdivided and sold portions of the property, including the 18.62-acre subject property.
- Capital Region Economic Development Corporation (CREDC) purchased the 18.62 acre property from the Commonwealth of Pennsylvania in March 2006.
- NL Ventures purchased the property from CREDC in April 2006.
- NL Ventures remained the property owner in 2007.

Details regarding the historical use of the property were obtained from the BER (2007) and the COA (2008) and are described in the following paragraphs.

From 1916 to 1942, HSC acquired and consolidated several parcels totaling 23.86 acres that included the 18.62-acre property occupied by the facility. In December 1943, DPC purchased the 23.86 acres from HSC and built a plant known as PLANCOR 502. HSC operated the plant and manufactured high pressure gas cylinders and demolition bombs, and shells without live charges. Construction began in April 1942 with partial and full operation occurring in March and June 1943, respectively. DPC improved the entire property with 22 structures including the main manufacturing plant; carpenter shop; boiler house; maintenance building; and four 78,000-gallon fuel oil underground storage tanks (USTs) and associated pump house, formerly located on the northeast corner of the main manufacturing plant (Appendix B: Figure 2 - Facility Layout).

In October 1945, PLANCOR 502 was declared surplus property and was sold to the Commonwealth of Pennsylvania in April 1949. The disposal deed contained a clause that would allow the United States government to activate the plant for the purposes of national defense for 20 years after the disposal date. In June 1951, the United States Air Force notified the Commonwealth of Pennsylvania that the property was required for national security purposes, and use, control, and possession was granted to the United States government. Thompson Products, Inc. (predecessor of Thompson, Ramo, Woodbridge, Inc., which was the predecessor of TRW, Inc. [TRW]) operated the plant for the Air Force manufacturing airplane engine parts. The lease indicated that it was automatically renewed until May 1956. No lease termination was documented; therefore, it is assumed that the lease ended in1956. An evaluation of the property

by the Defense Environmental Restoration Program - Formerly Utilized Defense Sites (DERP-FUDS) indicated that the Site was formerly used by the Department of Defense (DOD) and was therefore eligible for coverage under this program (Department of the Army, 1996). Potential safety hazards were identified at the Site under the category of Ordnance and Explosive Waste (OEW). It was believed small arms ammunition may have been present during DoD's use of the property. However, because DOD's policy stated that further OEW investigation was not required when small arms was the only potential OEW hazard at a site, no further action was recommended (discussed in further detail in the *Investigations and Remedial Actions to Date* section).

The Commonwealth of Pennsylvania leased out the property since its purchase in 1949. Several smaller parcels of the larger tract were ultimately sold. In 1968, the Commonwealth of Pennsylvania sold approximately 0.75 acres located at the southwest corner of the intersection of Cameron and Calder Streets to Stanley Spring Works (Appendix B: Figure 2 - Facility Layout). Stanley Spring Works deeded this parcel to TRW in 1980, which was later deeded to Dayton Parts, Inc. (Dayton) in 1988. According to Dayton's website (www.daytonparts.com, accessed March 29, 2010), Stanley Spring Works was sold to TRW, forming Dayton Parts, Inc. in 1988. This parcel was the focus of remedial activities for which TRW was responsible (discussed in the *Investigations and Remedial Actions to Date* section).

In 2000, the Commonwealth of Pennsylvania sold a 2.3-acre parcel located at the southeastern corner of the intersection of Cameron and Calder Streets to CREDC, which was subsequently sold to a property management company (Ritter Properties) for redevelopment. The property is currently owned by G&R, LP. The former TRW administration building located on this property is currently leased to several tenants (Appendix B: Figure 1- Facility Location Map).

In 2006, the Commonwealth of Pennsylvania sold 18.62 acres (on which the subject facility is located) of the remaining 20.83-acre property to CREDC. The property was sold to NL Ventures via TAD who ultimately leased the property. The Commonwealth of Pennsylvania retained a 2.2-acre parcel located directly north of the main manufacturing building, which is currently operated as an information service server facility by the Pennsylvania Department of Transportation (Appendix B: Figure 1- Facility Location Map).

Historical tenants of the former 18.62-acre manufacturing facility owned by the Commonwealth of Pennsylvania include Thompson Products, Inc. in the 1950s and TRW from the 1960s to 1986. Both tenants manufactured jet airplane parts. Chromalloy took over operations from TRW in 1986. TAD commenced manufacturing operations in 2002. The current property owner is NL Ventures. The facility was leased by TAD until January 10, 2010, when facility was vacated. The facility is currently vacant and the majority of the equipment sold. Wastes generated by TAD remain on-site and are currently being managed by the NL Ventures under the COA, dated July 11, 2008, to which TAD is also a party.

Site Operations

The subject and surrounding properties were owned by HSC between 1916 and 1943. HSC reportedly used the property as a slag disposal site in the 1920s and 1930s (ATK, 1989). The facility was constructed in 1942 and manufacture of high pressure gas cylinders and demolition bombs, and shells without live charges began in 1943. The facility was ultimately sold to the Commonwealth of Pennsylvania in 1949, and has been used for the manufacture of jet airplane parts since that time. The facility has been operated by various leased entities, specifically TRW, Chromalloy American Corporation (Chromalloy), and TAD. Note that TRW operated on both the subject property (18.62 acres) and the property currently owned by Dayton (formerly Stanley Spring Works, located west of Paxton Creek and at the southwest corner of the intersection of Cameron and Calder Streets, Appendix B: Figure 1 - Facility Location Map). However, TRW operated as two separate entities using separate USEPA ID numbers. TRW Turbine Airfoils Division (USEPA ID PA003010113, subject facility) operated on the subject property, while TRW Heavy Duty Parts Division (USEPA ID PAD101657179, now owned by Dayton Parts Harrisburg Truck Springs Manufacturing) operated on the property currently owned by Dayton.

TRW, the original applicant of the Part A Hazardous Waste Permit submitted in 1980, conducted the following operations at the facility: (1) finish machining of both rotor and stator turbine blades to final size for sale as original equipment; (2) bonding a metallic or ceramic coating on some turbine blades to enhance oxidation and/or sulfidation resistance; and (3) providing a repair service for used rotor and stator blades for turbine users and operators.

During 1988, TRW manufactured blades and vanes for the aircraft industry according to the manufacturing process described in the Resource Conservation and Recovery Act (RCRA)

Facility Assessment (RFA) (AT Kearney, 1989). The parts were manufactured from an alloy of nickel and cobalt. The machining process consisted of either the conventional methods (forging or casting, depending on the type of blade) or the electro-discharge machining (EDM) method. The conventional method required descaling using potassium hydroxide and degreasing using 1,1,1-trichloroethane (TCA), followed by sandblasting. Certain areas of the parts (such as the airfoil and gas path areas) were coated with aluminum silicon powder and heat-treated in a furnace to provide strength. The part was then etched with a solution of phosphoric, hydrochloric, or nitric acid to remove surficial impurities. Following the etching process, the part was provided with a hardened wearing surface by a plasma spray process before final inspection. The EDM method employed an electrode in a dielectric fluid (EDM oil) for a greater precision in shape than the conventional process, wherein the part took the shape of the electrode. After the part was shaped, the method of manufacturing for the final process was the same as the conventional process. The EDM oil was never disposed, but continuously recycled from a 5,000-gallon tank. The sludge accumulated on the filters (from recirculation of the oil from the tank) was collected in drums. Analytical data indicated that it was not ignitable, reactive or extraction procedure (EP) toxic (ATK, 1989). The EDM sludge reportedly was transported offsite to Agmet Metals for disposal.

The facility operated initially under a treatment/storage/disposal (TSD) Part B Permit. Eventually, as the production declined, the facility changed its status to a conditionally exempt small quantity generator (CESQG). The facility also operated a permit-by-rule (PBR) wastewater treatment plant, and held a National Pollutant Discharge Elimination System (NPDES) permit and air permits for several emissions sources.

Appendix C contains an inventory of the documents and references used in the EI Report.

Permit and Regulatory Action History

Waste

On June 24, 1980, TRW submitted a Notification of Hazardous Waste Activity to USEPA filing as a large quantity generator (LQG) and TSD facility for F-listed wastes including spent halogenated solvents (F001 and F002, trichloroethene [TCE], 1,1,1-TCA, and tetrachloroethene [PCE]), spent non-halogenated solvents (F003 and F005, methyl ethyl ketone [MEK]), spent

cyanide solutions from salt bath pot cleaning from metal heat treating operations (F011), quenching wastewater treatment sludges from metal heat treating operations where cyanides were used in the process (F012), and paint-related wastes (F017 and F018); and D-characteristic wastes including D001 (ignitable), D002 (corrosive), D006 (toxic for cadmium), and D007 (toxic for chromium).

On August 1, 1980, TRW submitted a letter to USEPA adding F006 (wastewater treatment sludges from electroplating operations), F007 (spent cyanide plating bath solutions from electroplating operations), F008 (plating bath residues from the bottom of plating baths from electroplating operations using cyanide), and F009 (spent stripping and cleaning bath solutions from electroplating operations using cyanide) wastes as a result of USEPA's broadening of the definition of the term electroplating to include some process operations that were conducted at the facility. USEPA subsequently amended TRW's hazardous waste notification form on August 1, 1980.

On November 12, 1980, TRW submitted a Part A Hazardous Waste Permit Application to USEPA for generation of the F-listed and D-characteristic wastes described above except F003, F012, and F018 wastes.

On July 28, 1981, USEPA issued interim status to TRW, which included a design capacity for storage of 149,000 gallons of F-listed wastes (F001, F002, F005, F006, F007, F008, F009, and F011) and D-characteristic wastes (D001 and D002) in tanks and containers and treatment of up to 163,000 gallons per day of these wastes in tanks. An attachment to TRW's conditions of operation during interim status indicated that F-listed paint-related wastes F017 and F018 were temporarily suspended from regulation as listed hazardous wastes until further study was completed. However, TRW was responsible to determine whether these waste streams were hazardous by one or more of the general characteristics (reactivity, ignitability, corrosivity, or EP toxicity) and therefore, subject to regulation under RCRA.

On November 5, 1982, PADEP issued a formal request to TRW for the facility's Part B application. On November 21, 1983, a notice of violation (NOV) was sent to TRW, by PADEP, for failure to submit a Part B application. On November 30, 1983, TRW responded by submitting a letter of intent to terminate storage activities.

TRW submitted a notification of hazardous waste to PADEP on January 1, 1984, deleting generation of F-listed wastes F001 (TCE, 1,1,1-TCA, and PCE), F005 (MEK), and D002/D007 (waste acid liquid and waste sodium hydroxide solids).

On April 30, 1985, PADEP issued another NOV to TRW for failure to submit a closure plan for storage activities. TRW subsequently submitted a closure plan to PADEP on June 20, 1985, indicating its intent to convert its existing hazardous waste storage facility to less than 90-day storage. After completing revisions requested by PADEP, the closure plan was approved on May 28, 1986.

On February 10, 1994, the facility submitted a notification of hazardous waste to USEPA indicating that the wastes generated on-site included greater than 1,000 kilograms per month of F-listed wastes F001, F002, F003, and F005 and D-characteristic wastes D002 and D000 (not specified). According to a USEPA Resource Conservation and Recovery Information System (RCRIS) Notification form dated March 21, 1994, the facility was noted as no longer a TSD facility and the name of the facility was changed to Chromalloy Turbine Airfoils.

On August 9, 1994, PADEP requested that Chromalloy submit a Residual Waste Impoundment Notification (Form T3), based on a review of the facility's industrial waste discharge records, which indicated that one or more residual waste impoundments were location at the facility. On August 24, 1994, PADEP issued a letter to Chromalloy indicating that based on an August 12, 1994 telephone conversation with a facility representative, no waste or process water impoundments were present at the facility; therefore, submission of Form T3 was not required.

On April 19, 2001, Chromalloy submitted a notification of hazardous waste to USEPA indicating that due to decreases in production and staffing, generation of hazardous wastes similarly decreased to small quantity generator (SQG). The only wastes reportedly generated at the facility were F002 and D001 wastes.

On January 28, 2005, in response an inquiry made by TAD in which the facility requested clarification regarding whether the F006 hazardous waste listing applied to the wastewater treatment sludge filter cake generated at the facility, PADEP determined that the F006 listing did not apply to the filter cake generated at the facility. The determination was based on the understanding that the facility conducted acid-dipping of metal parts for the sole purpose of

cleaning and stripping the surface in preparation for application of a fluorescent penetrant that afforded inspection under ultraviolet light to reveal cracks or other surface discontinuities. According to the letter, a December 2, 1986 USEPA interpretive rule (51 FR 43350 - 43351) clarified the scope of the F006 listing to include cleaning and stripping processes only when associated with the following electroplating operations: common and precious metals electroplating, anodizing, and chemical etching and milling. Neither electroplating nor anodizing operations were conducted at the facility. In addition, PADEP did not consider TAD's acid-dipping process as chemical etching or milling, which typically involves intentional removal of metal.

Air

The facility operated several air emission sources under the following air permits:

- 22-399-008A - Acid Etch Area
- 22-327-005B - Open Top Vapor Degreaser
- 22-327-003A - Open Top Vapor Degreaser
- 22-318-015B - Plasma Spray Booth #31662
- 22-318-012C - Plasma Flame Spray Booth
- 22-307-018B - Sandblasting Operation
- 22-307-019C - Paver Handler System
- 22-307-029C - Electric Discharging Machine with Dielectric Oil
- 22-307-008A - Furnaces
- 22-302-075A - Boilers

At various times during the facility's history, plan approvals and operating permits were obtained; however, NOVs were served by PADEP because equipment was installed and operated without appropriate approvals or permits. Details are provided in the following paragraphs.

On October 16, 1974, PADEP issued a NOV for visible emissions observed from the stack of one of the facility's Keeler boilers on September 13, 1974.

On June 12, 1980, PADEP issued TRW a letter agreement for violations related to the installation and modification without plan approval and subsequent operation without operating permit of

several air emission sources that included the following: five air turnover systems; two Cleaver-Brooks boilers; one spray booth; one rotary table blast cabinet and associated air pollution control device; three powder dumping, cleaning and packing operations and associated air pollution control devices; and one electrolytic steam drill machine and associated air pollution control device. A $700 fine was payable to Commonwealth of Pennsylvania Clean Air Fund.

On October 10, 1980, TRW sent a letter to Occupational Safety and Health Administration (OSHA) in response to a September 12, 1980 letter regarding complaints alleging lead inhalation hazards at the melt-out pot and dust inhalation hazard from flapper wheels. Explanations were supplied by the facility about the alleged exposures.

On May 12, 1981, PADEP sent a letter to TRW regarding a violation caused by dust emissions to the outside atmosphere from a Slyblast operation. The letter indicated that the emissions appeared to be a result of mechanical shakers that were in disrepair and bags that were clogged. PADEP requested that TRW submit an abatement plan and completion schedule within 15 days of receipt of the NOV.

On April 5, 1982, PADEP observed powder dust emitting to the atmosphere reportedly resulting from a malfunction of the Rotoclone scrubber system that controlled three powder blending stations and one powder screening station. On April 19, 1982, PADEP issued a NOV to TRW regarding the fugitive emissions and required the facility to submit abatement plans, a completion schedule, and outline preventative measures to assure future compliance within 30 days of receipt of the NOV.

An internal PADEP memorandum dated September 17, 1982 discussed violations observed during a semi-annual compliance inspection conducted at the facility. According to the memorandum, the operator was not following proper procedure for operation of one of the facility's vapor degreasers (Baron-Blakeslee unit). In addition, the covers on both vapor degreasers were not closed after operation, resulting in a violation of the regulations. Slight visible emissions were observed emanating from the stacks of the plasma spray unit wet collector. Further investigation indicated that the visible emissions were a result of poor maintenance of the collector. No violation was issued for these visible emissions.

On March 8, 1984, PADEP issued a NOV to TRW for installation and subsequent operation of a water curtain controlling emissions emanating from the plasma spray booth without prior plan approval or an operating permit. PADEP required the facility submit an application for plan approval within 30 days of receipt of the NOV. On May 21, 1984, PADEP served TRW with a letter agreement for the violations that included a fine of $300 payable to Commonwealth of Pennsylvania Clean Air Fund.

On April 20, 1984, PADEP issued a letter to TRW indicating that the operating permits for five natural gas combustion heat sources would not be renewed as these sources were exempted from permitting requirements. Accordingly, operating permit numbers 22-302-077 through 22-302-081 were not renewed.

On October 17, 1985, PADEP noted that the facility installed and operated some equipment without plan approvals and operating permits. An Empire fabric collector was installed and subsequently operated on the sandblast system. In addition, a Metco wet curtain system (which replaced the PADEP-approved Paasche water curtain system) was installed and subsequently operated on the plasma spray system. On October 22, 1985, PADEP issued a NOV to TRW for the violations, requiring the facility to submit an application for plan approval within 30 days of receipt of the NOV and suspending operation of the Empire fabric collector. A PADEP internal memorandum dated December 6, 1985 noted that the facility contacted PADEP on November 12, 1985 indicating the following: a plan approval for the Metco water curtain would be submitted, the Empire baghouse dust collector would be moved back to original non-used source, the sandblasting operations controlled by the unpermitted Empire fabric collector would be controlled by the permitted Micropul baghouse (operating permit 22-307-018), two spray booths would be scrapped, and all sandblasting operations covered under operating permit 22-307-018 would be moved into the room containing the two spray booths. The memorandum further indicates that no plan approval applications were received from the facility as of December 6, 1985.

On December 12, 1985, PADEP prepared an internal memorandum indicating that three settlement agreements had been issued to TRW for repeatedly installing and operating equipment without plan approvals or operating permits. The memorandum indicated that the history of violations should be taken into account if additional settlement agreements were made with the facility.

After a fire that occurred on February 4, 1986, after which much of the facility was destroyed, TRW contacted PADEP on February 25, 1986 to discuss the possibility that several permitted sources may be moved from the Cameron Street facility to a temporary facility located in Susquehanna Township (PADEP internal memorandum, March 6, 1986), one of which (vapor degreaser) would require a plan approval prior to its transfer to the temporary facility. The PADEP memorandum also indicates that several areas located in the southern portion of the facility were not affected by the fire.

On June 5, 1986, TRW informed PADEP of a change of facility ownership from TRW to Chromalloy American Corporation. Seven air permits were affected by the change of ownership that included the following equipment: two Cleaver Brooks and one Keeler boilers (operating permit 22-302-075), five coating furnaces (operating permit 22-307-008), two plasma spray booths (operating permit 22-307-012B), one sand blasting operation (operating permit 22-307-018), one powder handling system (operating permit 22-307-019A), two plasma spray systems (operating permit 22-318-015), and one solvent vapor degreaser (operating permit 22-327-003).

On June 16, 1987, PADEP issued a NOV to Chromalloy for violations regarding modifications to and operation of a new AAF Rotoclone in the powder handling system without plan approval or an associated operating permit. PADEP required Chromalloy to submit an application for plan approval within 30 days of receipt of the NOV. A PADEP internal memorandum dated September 25, 1987 indicated that the application for plan approval was received and under review, and the violation was considered abated.

On September 30, 1987, Chromalloy submitted a letter to PADEP explaining some of the delays in achieving compliance with the regulations of the Air Quality Control Program.

On February 25, 1988 PADEP issued a letter agreement to Chromalloy in settlement of the violations related to operating sources without plan approvals or operating permits from June 6, 1986 to November 17, 1986 and April 2, 1987 (the sources were operated under permits issued to TRW). A $2,500 fine was imposed on the facility made payable to Commonwealth of Pennsylvania Clean Air Fund.

PADEP issued an NOV to Chromalloy on June 27, 1989 related to modification of sources permitted under operating permit 22-307-029 without a plan approval (the facility installed five

EDMs controlled by a Fleximesh Mist Eliminator), and visible emissions from the baghouse permitted under operating permit 22-307-018. PADEP required the facility to submit an application for plan approval for the EDMs within 30 days of receipt of the NOV, and abatement plans for the visible emission from the baghouse within 15 days of receipt of the NOV. In addition, operation of the EDMs was suspended.

On March 25, 1990, PADEP issued a settlement of air quality violations to Chromalloy for the violations described in the June 27, 1989 NOV. A $3,000 fine was imposed on the facility payable to the Commonwealth of Pennsylvania Clean Air Fund.

Limited information was located in the regulatory files related to air permitting for the facility between 1990 and 2010. However, according to a November 7, 2000 PADEP air quality inspection report, the facility (Chromalloy) was operating at a greatly reduced capacity and may want to consider applying for a State Only Operating Permit. Based on information obtained from a PADEP air quality inspection report dated December 14, 2001, Chromalloy was issued State Only (Natural Minor) Operating permit 22-03049 in 2001, which included the conditions and requirements of operating permits 22-307-008A (heat treat furnaces), 22-307-029C (EDMs), 22-307-030 (powder handling system), 22-318-012C (plasma spray operations), and 22-399-008C (acid etch area). The permit was reissued on April 20, 2004.

On November 4, 2004, TAD submitted to PADEP a request for change of ownership from Chromalloy to TAD for permit 22-03049. PADEP issued the amended permit on April 21, 2005, which expired on April 20, 2009. The permit was not renewed as TAD discontinued operations in January 2010.

NPDES and Wastewater

The facility operated under a NPDES permit for discharge of stormwater associated with industrial activities (NPDES PA0008109, later transferred to TAD and reissued under permit PAR803638). Available records indicate that the permit was issued to Chromalloy in February 1984 for eight outfalls (001 through 008) discharging contact and non-contact cooling water and stormwater to Paxton Creek. Five of the outfalls received contact and/or non-contact cooling water and three received stormwater.

On January 4, 1991, PADEP issued a Consent Assessment of Civil Penalty to Chromalloy for violations of the Clean Streams Law for unpermitted industrial discharges to Paxton Creek because the facility's NPDES permit had expired. A civil penalty of $3,000 was payable to Commonwealth of Pennsylvania Clean Water Fund. The consent assessment was executed on February 5, 1991.

On July 29, 1991, PADEP requested Chromalloy submit analytical data so that total maximum daily loads (TMDL)/waste load allocations (WLA) could be estimated for watershed permitting associated with NPDES Permit PA0008109.

On January 6, 1992, PADEP served a NOV to Chromalloy for pH of discharge sample collected at Outfall 004 not meeting the limits set within the NPDES permit. In response to the NOV, the facility replied on January 14, 1992 stating that Outfall 004 had not been used for at least 12 months and the non-compliance was attributable to stormwater runoff from heavy rain that had occurred on the day the sample was collected (September 25, 1991). The facility was waiting for a new stormwater regulation to take effect to plan a course of action to prevent future occurrences.

On May 12, 1992, PADEP served Chromalloy with a NOV for failure to include analytical results for chloroform, TCE, and PCE in the first quarter 1992 Daily Monitoring Reports (DMRs). PADEP advised the facility to include these results in future quarter DMRs to comply with the terms and conditions of the NPDES permit.

On July 30, 1992, PADEP informed Chromalloy of a tentative determination to issue NPDES permit PA0008109 and noting discharge limitations for Outfall 001. In addition, the facility was informed that some reduction of total chromium levels in its effluent may be needed to comply with the permit limits, and a COA may need to be negotiated between PADEP and the facility specifying a plan and schedule for attaining compliance with the total chromium limit. On September 9, 1992, Chromalloy replied to PADEP conveying its concern meeting the total chromium limit. The facility requested information regarding negotiation of a COA, and requested further information on January 18, 1993. An internal PADEP note indicated that including a schedule for compliance in the final permit was preferred to negotiating a COA.

On July 28, 1995, Chromalloy was issued NPDES permit PA0008109 (expiration date of July 28, 2000) with limits for the following outfalls:

- Outfall 001: Process water, non-contact cooling water, stormwater
- Outfall 101: Process water from wash racks and flush fixtures
- Outfall 004: Rotary furnace and induction heater cooling, and stormwater
- Outfalls 001 through 003 and 005 through 008: Catch basins and roof drains

On December 15, 1995, Chromalloy informed PADEP that effluent would no longer be discharged from Outfalls 001 and 101. The discharge water would be reclaimed for use in other processes within the facility. In addition, Outfall 004 would no longer be used because the non-contact cooling water that was being discharged through the outfall would no longer be generated since the forge equipment that generated the discharge water was removed from the facility.

On March 25, 2000, PADEP informed Chromalloy that its NPDES permit would expire on July 28, 2000. If the facility intended to continue discharging to the Paxton Creek, the permit needed to be renewed at least 180 days before its expiration date. Although specific documents related to the renewal of NPDES permit PA0008109 were not found during the regulatory review, a notification for name change form dated October 28, 2004 with attached permit amendment indicates that the facility continued with permitted discharges to Paxton Creek under NPDES permit PAR803638, issued August 4, 2000.

On October 28, 2004, TAD submitted an application to PADEP to transfer NPDES permit PAR803638 from Chromalloy (also listed as Chromalloy Gas Turbine Corp) to TAD. The permit was transferred to TAD on December 30, 2004.

TAD submitted a notice of intent (NOI) to renew NPDES permit PAR803638 to PADEP on February 18, 2005. Note: the NOI lists nine outfalls identified as S01 through S09 (S09 is reportedly located on the neighboring property owned by the Pennsylvania Department of Transportation [PennDOT]). The outfall identification numbers differ from those permitted under Chromalloy's NPDES permit PA 0008109 (i.e., 001 through 008, and 101).

B. Description of all Solid Waste Management Units (SWMUs) and/or Areas of Concern (AOCs)

SWMUs and AOCs Identified During RCRA Facility Assessment (RFA) (1989)

In 1989, on behalf of USEPA, AT Kearney (ATK) conducted a RFA of the TRW facility to identify and evaluate past and potential releases to the environment from SWMUs and other AOCs present at the facility. ATK identified the following seven SWMUs and three AOCs during its evaluation of the TRW facility (Appendix B: Figure 3 - SWMU Location Map):

- SWMU 1: Waste Storage Area – a 40 foot by 60 foot outdoor, roofed concrete pad used to store waste coolant, grinding sludge (aluminum oxide), petroleum oil/sludge and hydraulic oil from the machining area, and EDM sludge from the EDM processing area. Wastes stored in this SWMU were containerized in sealed 55-gallon drums. SWMU 1 was surrounded by an 8-foot high chain link fence and contained within a four-inch high concrete dike. A floor drain underlain by a sump to collect spills was present.

- SWMU 2: Hazardous Waste Storage Area – a 20 foot by 40 foot outdoor concrete pad located under the same roof as the waste storage area (SWMU 1) used to store waste TCE, MEK, Freon, Safety-Sol 24, and l,l,l-TCA. Wastes stored in this SWMU were containerized in sealed 55-gallon drums. SWMU 2 was surrounded by an 8-foot high chain link fence and contained within a four-inch high concrete berm. A floor drain underlain by a sump was present to collect spills. Access to the hazardous waste storage area was locked. Note: According to the RFA, SWMU 2 was unpaved prior to 1983 and drums of TCE were discovered to be leaking. Hazardous waste manifests included in the RFA indicate that approximately 500 tons of soil contaminated with TCE was transported offsite between July 16 and August 19, 1982 for disposal. According to the RFA, the hazardous waste manifests are the only documentation available related to the release. No further documentation was located during the regulatory file review.

- SWMU 3: Wastewater Treatment Center – an indoor unit that consisted of 11 aboveground fiberglass tanks used to treat acidic rinse water from the acid etch area and caustic water from the hot melt tank. The tanks were situated on a concrete floor surrounded by a 6-inch high containment wall. Floor drains were present to collect spills and direct them back into the treatment system. Acid rinse waters were neutralized with lime slurry, flocculated, clarified, and recycled back to the process area for reuse.

Caustic waters were neutralized similarly, but separately from the acid rinse waters. Resultant sludges were accumulated in a sludge thickening tank, then dewatered, and stored in 55-gallon drums on the unpaved drum storage area (SWMU 4) for subsequent offsite disposal. Chromalloy representatives indicated that the sludge was managed as non-hazardous waste.

- SWMU 4: Unpaved Drum Storage Area – a 10 foot by 120 foot uncontained, unpaved outdoor area used to store aluminum oxide slurry sludge from the sandblasting operations and sludge from the wastewater treatment center (SWMU 3). Drainage from this area was contained in a catch basin that was directed to Paxton Creek. At the time of the RFA, 200 drums of aluminum oxide slurry sludge and 70 of wastewater treatment sludge were stored in this area awaiting disposal. The drums of wastewater treatment sludge ultimately were emptied into a 25-cubic foot hopper and transported to an offsite disposal facility.

- SWMU 5: Waste Coating Powder Storage Area – an 8 foot by 20 foot uncontained asphalted area used to store waste coating powder containing 92 percent aluminum oxide. Waste coating powders were transferred from a hopper into 55-gallon drums at this location. Drainage from SWMU 5 was contained in a catch basin that drained to Paxton Creek.

- SWMU 6: ASTs – three 5,000-gallon ASTs used to store waste coolant, spent petroleum oil, and spent synthetic oil. According to the RFA, only two of the tanks were ever used. The tanks were situated on a 10 foot by 20 foot gravel area surrounded by a two-foot high sloped gravel wall. ATK observed dry, black stained soils outside of the gravel wall. The facility reportedly indicated that the stains were the result of oil leaking from trucks.

- SWMU 7: Air Scrubber Unit – a 40,000 cubic feet per minute air scrubber used to neutralize acidic vapor from solutions of nitric, phosphoric, and hydrochloric acids used in the acid etching area before releasing to the atmosphere. The air was neutralized using liquid caustic soda. The wastewater generated by the air scrubber unit was directed to the wastewater treatment center (SWMU 3). SWMU 7 was surrounded by a 12-inch high by 6-inch wide secondary containment wall.

- AOC 1: Reported Spills - During a fire on February 3, 1986 there were reports of a nitric acid spill to soil near the northwest corner of the manufacturing building and an oil spill and nitric acid spill to Paxton Creek. The nitric acid spill to the soil on the northwestern

corner of the building reportedly was diked with sand and neutralized with soda ash. However, according to the RFA, analytical data from samples collected at the time of the spill did not indicate the depths of sampling or the lateral extent of the spill. Originally attributed to the facility, the oil spill to Paxton Creek was later attributed to the Conrail Railroad Yard which is located upstream of the facility. A report of a spill of nitric acid to Paxton Creek could not be confirmed (it was later discussed in the RFA that the report was erroneous). Information on the oil and nitric acid spills to Paxton Creek was limited and could not be verified.

Note: Documentation appended to the RFA indicated that 14 surface soil samples were collected on February 5, 1986 related to the nitric acid spill. Ten (10) samples were collected from within the suspected extent of the spill (Appendix B: Figure 3 - SWMU Location Map). One sample was collected from within the virgin chemical storage area, and a second sample was collected directly outside of the virgin chemical storage area. One control sample was collected outside the northern extent of the spill, and a second control sample was collected outside the southern extent of the spill. Both control samples were collected adjacent to the railroad tracks. The majority of the samples were collected from a depth of one foot below the ground surface (bgs). One of the samples collected within the suspected extent of the spill was collected from a depth of two feet bgs. The soil samples were analyzed for cyanide, corrosivity, and toxicity characteristic leaching procedure (TCLP) RCRA metals. A sample of standing water also was collected from within the extent of the spill. The water sample was analyzed for VOCs.

The analytical results indicated that the soil samples were non-corrosive. Cyanide was detected in 13 of the soil samples at concentrations ranging from 0.095 mg/kg to 136 mg/kg (located within the virgin chemical storage area). The current direct contact soil non-residential (NR) medium-specific concentrations (MSCs) (0 to 2 feet) is 5,600 mg/kg, and the current soil-to-groundwater NR MSC is 200 mg/kg. Arsenic was detected in the leachate of 12 of the soil samples ranging from 0.026 mg/L to 1.24 mg/L. The USEPA regulatory limit is 5 mg/L. Lead was detected in the leachate of the control sample collected north of the spill area, near the railroad tracks, at a concentration of 0.08 mg/L (regulatory limit is 5 mg/L). Chromium was detected in the leachate of the soil sample collected inside the virgin chemical storage area at a concentration of 0.08 mg/L (regulatory limit is 5 mg/L). VOCs were not detected in the standing water sample.

No further information was found during the regulatory file review related to the nitric acid spill.

- AOC 2: USTs - During a UST removal project conducted in April 1986, soil contaminated with fuel oil and gasoline was identified around five USTs located near the northeast corner of the manufacturing building. The contaminated soil was removed, drummed, and disposed in an approved landfill. According to the RFA, the dates these activities occurred and post-excavation data indicating complete removal of the contaminated soil were not available. The extent of the contamination could not be determined as stated in the RFA. Note that information regarding removal of these USTs located during the regulatory file review indicates that the five USTs were removed by May 1, 1986 (OBG, 1986). There was no documentation located that indicates post-excavation sampling was conducted.
- AOC 3: Slag Disposal Area – During the RFA, a facility representative indicated that the entire property had been used as a slag disposal area by HSC in the 1920s and 1930s. However, details regarding the slag disposal were not obtained as part of the RFA work.

SWMUs and AOCs Identified During Recent Investigations (2007-2009)

Investigations and inspections conducted at the facility since the 1986 RFA, including the most recent inspection conducted by PADEP on March 25, 2009, and follow-up inspections conducted May 13, and September 24, 2009, update the hazardous and residual waste conditions at the facility. On February 3, 2010, an inspection was conducted at the site to evaluate and report on the current conditions of the SWMUs and AOCs identified in 1986 by ATK and those identified during review of regulatory files for the facility. The findings of these investigations and inspection and the current conditions of the SWMUs and AOCs, as viewed during the February 2010 site visit, are described in the following sections.

AOCs (2007)

In 2007, AES conducted an environmental investigation to determine baseline soil, groundwater, and soil vapor conditions at nine AOCs identified at the facility. The AOCs investigated by AES included (Appendix B: Figure 4 - AOC Location Map):

- AOC 1: Former USTs - Four fuel oil USTs (72,000 gallons, 74,000 gallons, 76,000 gallons, and 78,000 gallons) and one 1,000-gallon unleaded gasoline UST (*ATK AOC 2*)
- AOC 2: Former USTs - Two 20,000-gallon fuel oil USTs
- AOC 3: Former UST - One 1,000-gallon fuel oil UST
- AOC 4: Former USTs - Three 2,000-gallon fuel oil USTs
- AOC 5: Former ASTs and Current AST - One 20,000-gallon fuel oil AST, one 5,000-gallon fuel oil AST, one 10,000-gallon waste oil AST, one 5,000-gallon TCE AST, and one 5,000-gallon waste oil AST (existing)
- AOC 6: Former ASTs - Two 5,000-gallon waste oil ASTs (*ATK SWMU 6*)
- AOC 7: Transformers
- AOC 8: RCRA Waste Area (*ATK SWMUs 1 and 2*)
- AOC 9: Landfill: Fill material (slag) covering entire property (*ATK AOC 3*)

During AES' investigation, there was no evidence of active USTs at the facility, and none were known to have been present since removal of 11 USTs from four general locations on the property in 1986/1987. The former USTs, ranging in volume from 1,000 gallons to approximately 78,000 gallons, were used for storage of fuel oil and gasoline, and were designated by AES as AOCs 1 through 4. Correspondence from OBG Technical Services (OBG, a consultant to TRW) to PADEP dated April 10, 1986 indicates that petroleum impacted soils were discovered at the excavation site of four former USTs located in AOC 1 and AOC 2. Several ASTs also were removed from the property in approximately 2000. The ASTs were used for storage of fuel oil, waste oil, and TCE. The ASTs were situated at two locations on the property that were designated by AES as AOCs 5 and 6.

At the time of AES' investigation, five ASTs existed on-site (AES, 2007), including the following (Appendix B: Figure 4 - AOC Location Map):

- One, 5,000-gallon waste-oil AST situated within a concrete secondary containment
- One, 2,000-gallon propane AST situated within the asphalt-paved parking area
- One liquid hydrogen AST of unreported quantity located at the west side of the facility

(including caustic soda, corrosive materials, and fungicide/bactericide) were observed stored adjacent to the south wall of the treatment room. These containers were either empty or contained a small amount of liquid. A 55-gallon plastic drum containing approximately five gallons of an unknown liquid also was observed in this area. A pallet of approximately 20 bags of hydrated lime was stored near the lime slurry tank, which also contained residual liquid. In the room adjacent to the wastewater treatment system, several containers of liquid labeled "compressor oil" were observed as well as several propane cylinders.

ATK's SWMUs 4, 5, and 6 (AES AOC 6) were no longer present during the February 2010 site visit. These areas are currently asphalt-paved. The areas were partially snow-covered, but appeared to be in good condition; however, cracks were observed in some portions of the asphalt near the waste storage area. The nine 55-gallon drums labeled "Alliance Environmental" observed by PADEP in March 2009 were still present in the grassed area near the northeast corner of the building, south of SMWU/AOC 6. The condition of the drums was deteriorating.

No evidence of USTs was observed during the site visit. The location of the former 78,000-gallon USTs and the 1,000 gallon gasoline UST near the northeast corner of the building is currently a concrete loading dock. The area was snow covered during the site visit. No ASTs were present on-site except one 5,000-gallon waste oil AST located on the west side of the building. Site representatives indicated this AST was currently empty. Four other ASTs observed on-site included the 250,000-gallon water AST, and the LPG, liquid argon, and liquid hydrogen ASTs. The liquid argon AST was in good condition. The LPG and liquid hydrogen ASTs were rusting. It is unknown whether these tanks were empty at the time of the site visit.

The air scrubber unit (ATK SWMU 7 located in the acid etch area) remains on-site, but is currently not operational as the facility is vacant. Secondary containment for the scrubber unit and the drum of caustic soda used for neutralization was present. The outside exhaust unit appeared to be in good condition. The pad-mounted transformers (AES AOC 7) located near the southeast corner of the building were no longer present.

No extensive excavation has been conducted on-site to remove the underlying slag fill materials; therefore, AOC 3 (ATK)/AOC 9 (AES) remain. The majority of the property is covered by impervious surfaces (e.g., asphalt-paving and buildings). There are only a few small areas of gravel/grass on the property, which are located near the southern and western property

boundaries, along the west side of the main manufacturing building, and at the buildings northeast corner.

Much of the non-hazardous waste material stored at the facility has been removed; however, wastes still remain on-site that may be classified as hazardous. During the site visit, three additional areas of concern were observed (Appendix B: Figure 4 - AOC Location Map):

- A storage area for potentially hazardous wastes – The wastes are currently stored in a room located in the southcentral end of the building, awaiting sampling and analysis to determine the proper means of disposal.
- EDM filter room – According to Cycle Chem personnel, EDM oil contained in the 5,000-gallon holding tank was pumped out and disposed of offsite. There was reportedly no EDM sludge in the tank. During the site visit, EDM oil was observed in a pit that appeared to be leading an oil/water separator connected to the holding tank.
- Central coolant systems A and B – Two central coolant system rooms are located on the west side of the building. Room A is located on the southwestern end of the building, north of the EDM filter room. Room B is located on the northwestern end of the building, north of the wastewater treatment system room. Each system received oil and wastewater from machines that entered drains located throughout the building. In each coolant system room were two large holding tanks, approximately 15,000 gallon capacity. Both tanks in both rooms contained oily wastewater and sludge during the site visit. In room A, one of the holding tanks contained approximately eight inches of oily wastewater. The other holding tank was approximately half full. In addition, four open 55-gallon drums containing oily waste and sludge were observed near the west wall of room A. One of the holding tanks in room B was full, while the second holding tank contained approximately eight inches of wastewater. The walls and floor of both rooms were oily. The floor sumps and drains in both rooms were full. The floor sumps in room A were overflowing. (Note: the floor of room A is below grade.) It was approximated that the floor sumps in room B extended to approximately eight feet below the floor. The floor of room B is at grade.

Storage Tanks

In 1986, TRW began removing obsolete/suspected leaking USTs and any associated contaminated soil at the facility. Tank removal work was to be conducted at TRW's Turbine Airfoils Division (subject facility, PA003010113) and its Heavy Duty Parts Division (operating under USEPA ID PAD101657179, located immediately east of the subject facility – now owned/operated by Dayton). According to a letter from TRW's consultant, OBG, to PADEP dated April 25, 1986, the following USTs were scheduled to be removed:

TURBINE AIRFOILS DIVISION			
UST Identification	**Capacity and Construction**	**Contents**	**Date Removed**
1	78,000 gallons – concrete	No. 2 Fuel Oil	April 1986
2	72,000 gallons – concrete	No. 2 Fuel Oil	April 1986
3	76,000 gallons – concrete	No. 2 Fuel Oil	May 1, 1986
4	74,000 gallons – concrete	No. 2 Fuel Oil	May 1, 1986
5	20,000 gallons – steel	No. 2 Fuel Oil*	April 1986
5A	20,000 gallons – steel	No. 2 Fuel Oil*	April 1986
6	1,000 gallons – steel	Gasoline	April 1986
7	1,000 gallons – steel	No. 2 Fuel Oil	April 1986
8	2,000 gallons – steel	No. 2 Fuel Oil	April 1986
9	2,000 gallons – steel	No. 2 Fuel Oil	April 1986
10	2,000 gallons – steel	No. 2 Fuel Oil	April 1986
HEAVY DUTY PARTS DIVISION†			
HDP1	9,500 gallons – steel	No. 2 Fuel Oil	April 1986
HDP2	±500 gallons – steel	No. 2 Fuel Oil	Unknown

*It was reported in a letter dated April 4, 1985 that one of these tanks held No. 6 fuel oil.
†TRW Heavy Duty Parts Division purchased Stanley Spring Works forming Dayton Parts, Inc. in 1988. This division was operated under a separate USEPA ID number from the Turbine Airfoils Division (subject facility).

According to OBG's April 25, 1986 letter, all of the above USTs except UST 3, 4, and the 500-gallon UST located at the Heavy Duty Parts Division were removed by April 1986. Oil contaminated soil reportedly was encountered beneath the floor slabs of concrete USTs 3 and 4; therefore, the floor slabs of these two USTs and associated contaminated soils were excavated and disposed of offsite on May 1, 1986 under permit obtained from PADEP (April 25, 1986). Fuel oil was noted on the logs for two of the soil borings (Note: The location of these two borings could not be determined with the documentation reviewed; however, it is assumed that these two borings were installed near the former concrete USTs 3 and 4.)

The common wall (west wall) of the four concrete USTs and the north wall of UST 1 were left in place due to their close proximity to existing structures. The concrete floor slabs of USTs 1 and 2 were broken up and left in place, because it was determined that the underlying soil was not contaminated. The concrete floor and contaminated soil were removed from beneath USTs 3 and 4. No additional documentation, particularly related confirmatory soil sampling at any of the USTs excavations, was found during the regulatory file review.

Investigations and Remedial Actions to Date

Environmental Release (1986)

On March 17, 1986, TRW notified USEPA that an unknown quantity of oil from equipment and 55-gallon drums was discharged to Paxton Creek via the facility's outfalls during a fire that destroyed the facility on February 23, 1986. In addition, virgin chemicals including unknown quantities of nitric acid, sodium hydroxide, phosphoric acid, hydrochloric acid, ferric chloride, sulfuric acid, and hydrofluoric acid were released to the soils near northwestern end of the manufacturing building, and possibly to Paxton Creek. Adsorbent oil booms were placed in Paxton Creek to contain the release. The spill was reportedly diked with sand neutralized with soda ash (ATK, 1989). PADEP was informed of the release and responded immediately to provide guidance regarding mitigation and remediation.

UST Removals (1986)

On April 10, 1986, OBG informed PADEP of their intent to remove 11 USTs (Tanks 1 through 10 and 5A, Appendix B: Figure 5 - Soil Sampling Locations During Removal of USTs in 1986) at the facility, and the potential presence of contamination that was identified in soil samples from certain soil boring locations. The USTs ranged in capacity from 1,000 gallons to 78,000 gallons and were either empty, stored unleaded gasoline, or No. 2 fuel oil. A letter from TRW to PADEP dated April 4, 1985 indicates that No. 6 fuel oil was stored one of the 20,000-gallon USTs [UST 5 or 5A] located outside of the west side of the building. The tank reportedly was not used for some time, and approximately 500 gallons of No. 6 fuel oil sludge was present in the tank. A table listing the storage tank capacity, construction, and contents is provided in the Storage Tanks section of this report.

Prior to the start of excavation activities, OBG drilled several soil borings adjacent to each tank location. According to the soil boring location map included with OBG's April 10, 1986 letter, five borings were drilled directly east of concrete USTs 1 through 4; two borings were drilled through the concrete floor slabs of USTs 1 and 3; two borings were drilled adjacent to UST 5 (one to the west and one to the south of the tank); one boring was drilled directly west of UST 6; one boring was drilled directly south of UST 7; and two borings were drilled directly north of USTs 8, 9, and 10. The locations of the USTs and the borings drilled at each location are shown on Appendix B: Figure 5 - Soil Sampling Locations During Removal of USTs in 1986. Continuous split-spoon samples were collected to depths of one foot below each tank invert. Soil boring logs indicate that the depths of the soil borings ranged from 2.5 feet to 26.5 feet bgs. Fill materials (including brick, coal, slag, limestone cobbles, and concrete) were encountered to depths ranging from 12 to 26.5 feet bgs. Underlying native soils reportedly consisted of sand, silt, and gravel. In general, the borings were dry at completion; however, several of the logs indicate that the subsurface soils were wet below 12 feet bgs. Fuel oil was identified in two of the borings. (Note: The soil boring location map or the letter narratives did not include the boring numbers; therefore, it was not possible to correlate the boring locations with the UST references using the information obtained during review of the regulatory files. However, it is assumed that the borings containing fuel oil were drilled near former concrete USTs 3 and 4.)

Soil samples that were visually discolored or had a petroleum odor were composited and analyzed for oil and grease. The analytical results of the soil samples indicated that soil contamination was present around USTs 4, 5, 5A, and 6, and beneath UST 3 (Note: The analytical results were not located during the regulatory file review, nor were they discussed in reports related to the UST removals; therefore, specific concentrations are not discussed).

A letter from OBG to PADEP dated April 25, 1986 stated that all USTs except USTs 3 and 4, and the 500-gallon UST located at the adjacent TRW Heavy Duty Parts Division facility were removed. A letter dated May 2, 1986 from OBG to TRW indicates that USTs 3 and 4 were ultimately removed by May 1, 1986. Contaminated soils were stockpiled, then disposed of offsite under a permit issued by PADEP. The steel USTs were cleaned and sold for scrap. The common wall shared by concrete USTs 1 through 4 (west wall) and the north wall of UST 1 remained in place due to the close proximity of existing structures. The concrete floor slabs of USTs 1 and 2 were crushed and left in place, while the floor slabs of USTs 3 and 4 were excavated and disposed of. No information related to confirmatory soil sampling for any of the removed USTs was found during the review of regulatory files.

Release of Polychlorinated Biphenyl (PCB) Oil Identified During Pre-Construction Investigation (1987)

On June 1, 1987, Roux Associates Inc. (Roux) on behalf of TRW's Heavy Duty Parts Division, informed PADEP of plans to mitigate the migration of PCB oil that was discovered during drilling of structural borings to support re-construction of a building located immediately south of the intersection of Calder and Cameron Streets. The building was located on 0.78-acres of TRW's property that was sold to Stanley Spring Works (later Dayton Parts, Inc. - PAD101657179) in February 1968 [Department of the Army, 1986]) (Appendix B: Figure 2-Facility Layout). Note that operations conducted by TRW on this portion of the property were done so under a separate USEPA ID number (PAD101657179, Heavy Duty Parts Division) than the Turbine Airfoils Division (subject facility operating under USEPA ID PAD003010113).

According to the June 1, 1987 letter, Roux installed a four-inch diameter recovery well near the location of the most contaminated structural boring (boring B-1A) on May 14, 1987. It was noted that the subsurface materials consisted of approximately six feet of fill underlain by clay, which extended to boring refusal at 13.75 feet bgs. A minor sheen and odor was noted in the fill materials between four and six feet bgs. Roux concluded that the underlying clay materials were acting as a barrier to vertical migration of the oil, and that shallow groundwater at the site appeared to be perched on top of the clay. In addition, Roux hand-augered a boring approximately one foot from contaminated structural boring B-1A. Free-phase oil (approximately 0.75 inches thick) was encountered in the fill materials; however, there was no evidence of oil in the underlying clay.

Roux sampled the recovery well on May 20, 1987. Approximately 3.5 inches of free-phase oil was measured prior to purging the well. The well was bailed dry; and after two hours, approximately 1.5 inches of free-phase oil was measured in the well. Roux concluded that because of the low levels of oil and the slow recovery rate of the well, significant product recovery was not possible. Therefore, Roux recommended that a grout curtain be installed around the perimeter of the area where evidence of oil was identified and directed toward the recovery well, which would be manually bailed to recover any oil that migrated toward it. According to a PADEP inspection report dated July 28, 1987, Roux attempted to install the grout curtain; however, grouting was discontinued on August 4, 1987 due to failure (core borings showed grout was only present in lower two feet of fill materials).

Work Plan for Phase I Subsurface Investigation (1987)

On August 14, 1987, Roux prepared a work plan on behalf of TRW (subject facility operating under USEPA ID PAD003010113) to continue the investigation into the extent of the PCB oil identified at TRW's Heavy Duty Parts Division (former Stanley Spring Works facility, Appendix B: Figure 2 - Facility Layout). The work described in the work plan included the following: drilling of an additional 20 soil boring, collection of soil samples to be analyzed for VOCs and PCBs, installation of approximately 15 piezometers in the fill material, installation of three deep piezometers in the sand/gravel materials underlying the clay confining layer, digging of test pits along the western and northern boundaries of the Heavy Duty Parts Division property, monthly sampling of Paxton Creek, and analysis of the Paxton Creek surface water samples for oil and grease, and PCBs.

PADEP inspection reports dated September 16, 1987 indicate that no oil was observed in a test pit dug "along the TRW side of the fence"; however, it is unknown to which test pit this comment refers. A PADEP inspection report dated September 21, 1987 indicates that oil was observed in one soil boring drilled north of the monitoring/collection well (assumed to be the recovery well installed in May 1987). The inspection report further indicates that very little grout was observed in this soil boring. No grout was observed in other soil borings drilled at the site.

In a letter dated October 22, 1987, Roux informed PADEP that three piezometers (two monitoring the water above the clay confining layer and one monitoring the sand/gravel below the clay confining layer) would be installed in the sidewalk along Cameron Street. Three additional piezometers would be installed on TRW's property west of Cameron Street. The proposed piezometers were installed on November 2, 1987, according to a PADEP inspection report.

In a follow-up letter dated February 4, 1988 Roux communicated to PADEP that the result of their investigations indicated the following: there was no direct hydraulic communication between the groundwater perched above the clay confining layer and the groundwater contained within the underlying sand/gravel; free-phase oil appeared to be contained beneath the old building foundation (a sample of the free-phase liquid had a concentration of 87 parts per million PCBs); a leaking water main along Cameron Street was contributing to the perched groundwater in the fill materials; the perched groundwater flowed toward the storm sewer line under Calder

Street; PCBs were not detected in Paxton Creek surface water samples; and oil and grease values were higher in upstream surface water samples in contrast to the downstream samples.

Based on this information, Roux proposed to continue with installation of the grout curtain consisting of a rigid, cement-bentonite mixture of low-permeability (less than 1 x 10^{-6} cm/sec) that would be keyed into the underlying clay. In addition to the grout curtain, Roux proposed to install a shallow perimeter drain along Cameron Street to relieve pressure from the grout curtain. The drain would be tied into the existing storm sewer. A surface cap consisting of asphalt was proposed along with regrading of the site to prevent percolation of surface water to the contaminated area contained within the grout curtain. On February 22, 1988, PADEP approved the proposed plan.

No other information regarding completion of the remedial activities was located during review of the regulatory files; however, according to the Phase I Environmental Site Assessment (ESA) prepared by Epsys Corporation for a 3.4 acre portion of the property located north of the TRW Heavy Duty Parts Division facility (discussed under the *Phase I Environmental Site Assessment [1998]* section), the hydraulic barrier was installed southwest corner of the intersection of Calder and Cameron Streets.

From October through December of 1988, letters from Roux were submitted to PADEP stating the results of analytical data (oil and grease, EP toxicity for metals, and PCBs) used to characterize soil piles for offsite disposal. The letters indicated that these constituents were present in one or more of the soil piles; however, the concentrations were such that the soils were classified as non-hazardous for disposal. (Note: The sources of the excavation or analytical details were not provided in the letters).

RCRA Facility Assessment (1989)

The RFA of the TRW Turbine Airfoils Division facility was conducted by ATK to identify and evaluate actual and potential releases to the environment from SWMUs and other identified AOCs. Seven SWMUs and four AOCs, which are discussed in Section B and shown on Appendix B: Figure 3 - SWMU Location Map of this report, were identified at the facility. Details of the manufacturing process and wastes generated were presented in the RFA report, along with a list of wastewater permits, air emissions permits, and fuel oil/gasoline USTs.

General descriptions of the environmental setting (e.g., geology, hydrogeology, surface water, and meteorology) and pollution migration pathways were also provided.

Potential exposure pathways via soil, groundwater, and the surface waters of Paxton Creek were considered to be low. Potential receptors to contaminated soil were expected to be limited to facility employees; no groundwater wells were identified within a one mile radius of the facility; and Paxton Creek was not known to be used for recreational or drinking water purposes downstream of the facility. The report indicated there was no known potential exposure to subsurface gas resulting from activities conducted at the facility; however, exposure to airborne aluminum oxide particles and wastewater treatment sludge particles from the outdoor storage areas by facility employees and residents within one mile of the facility was identified as a potential exposure pathway. (Note: The RFA focused only on the Turbine Airfoils Division facility located west of Paxton Creek and did not include either of the parcels located east of Paxton Creek that were formerly owned by TRW, including the TRW Heavy Duty Parts Division. The facility was operated by Chromalloy at the time of the RFA.)

Two areas of stained soil (around the ASTs and in the northeast section of the facility property) were identified by ATK. ATK recommended sampling of soil in these areas for total metals and TCLP organics to verify that hazardous constituents were not present; however, it was noted that since the subsurface materials consisted of gravel and cinders, sampling may yield minimal results. No information regarding follow-up sampling was found during a review of the regulatory files.

Department of Army Preliminary Assessment (1996)

The Department of Army conducted a review of DERP-FUDS Findings and Determination of Eligibility for the HSC, PLANCOR 502 site (the entire 23.86 acre area owned by DPC, which included the portions of the property located east of Paxton Creek that were ultimately sold to and operated by others). The evaluation was conducted because the property was identified as a site formerly used by the DOD. It was determined the only potential hazard remaining on-site was related to small arms ammunition that may have been provided to guards stationed at the facility during DOD's use. No further action was recommended based DOD's use of the facility.

Oil Releases to Paxton Creek (1998)

On May 20, 1998, an oily sheen was noticed on Paxton Creek by a facility maintenance worker. The sheen was immediately reported to the Chromalloy's Safety Department. It was determined that the source of the sheen was an incidental release to the storm sewer system of cutting oil (Mobilmet Sigma) used in the machining process throughout the facility. Corrective actions were initiated and included: (1) removing all storm sewer grates and shoveling out all debris and sediment; (2) pressure washing the interior of the drain; and (3) retraining the Maintenance Department on spill control measures and procedures.

On June 11, 1998, a severe thunderstorm sent copious amount of storm water through the system and again, an oily sheen was noticed flowing from the same storm water outfall. The sheen migrated downstream and the Harrisburg Fire Department and the Dauphin County Hazardous Materials Response Team were called. A control point was set up approximately four miles downstream of the facility. PADEP arrived at Chromalloy to assess the environmental impact of the release. Reportedly, no impacts were observed from the outfall to the control point.

Eventually, the source of the oily sheen was found to be an improperly capped floor drain located beneath an oil-based coolant machine. All floor drains were capped and covered with concrete on June 12, 1998, and the storm water system was flushed. Chromalloy reported the details of the incidents to PADEP on July 22 1998.

Phase I Environmental Site Assessment (1998)

EPSYS Corporation (EPSYS) conducted a Phase I ESA on a 3.4 acre parcel located at the corner of Cameron Street and Riley Road, east of Paxton Creek (Appendix B: Figure 1 - Facility Location Map). This parcel was formerly used by TRW for its administrative offices. The parcel was improved with one 210,000 square foot two-story brick and block building (former TRW Administrative Building) with a basement and sub-basement. Three smaller buildings (a storage shed, guard station, and a natural gas utility building) also were located on this parcel.

No environmental conditions were recognized except for the presence of a 4,000-gallon heating oil UST (unknown age) located at the rear of the building. The UST was not required to be registered under PADEP regulations. A scope of work dated August 20, 1998, to remove the

heating oil UST (identified as a 12,000-gallon UST in this document) was submitted by Epsys. No further information was found during the regulatory file review regarding removal and closure of this UST.

Release of Metalworking Fluid to Paxton Creek (2000)

On September 13, 2000, Chromalloy notified PADEP of a release of fluid consisting of a mixture of CIMPERIAL 1010C metal working fluid concentrate and water, used as a coolant in machine-grinding operations. The release occurred on September 9, 2000 when a float that was critical to control the levels in the circulation system failed, allowing the fluid to overflow into the storm drain catch basin and into Paxton Creek. After cleanup was completed, the facility reported that the small quantity of the mixture released was a non-hazardous substance and no visible fish kill or environmental impacts were reported. However, realizing that any releases can have a negative impact on the environment, and to take preventative measures, Chromalloy conducted an audit throughout the facility to identify any potential materials that could be released; implemented engineering (secondary containment, spill response equipment, etc.) and administrative (emergency response training, revised emergency contingency plan, etc.) controls; ensured that contact information for emergency-response contractors was readily available; and ensured that appropriate contractors were selected. PADEP issued a NOV to Chromalloy for the discharge of metalworking fluid to Paxton Creek on September 28, 2000.

Phase I Site Assessment Report and Phase II Limited Subsurface Investigation (2006)

On January 26, 2006, LandAmerica Corporation (LAC), on behalf of NL Ventures, issued a Phase I Site Assessment Report for the facility. LAC identified several areas of recognized environmental conditions related to the former locations of USTs and ASTs, waste storage areas, stained areas observed during the Phase I evaluation, and the location of a pad-mounted electrical transformer that was in poor condition. LAC recommended further investigation be conducted in these areas.

In February 2006, LAC drilled 13 soil borings at the following locations (Appendix B: Figure 6 - Soil Boring and Temporary Well Location Map):

- SB-1 Adjacent to former UST 7 (No. 2 fuel oil UST)

- SB-2 Northern outside wall of metal grinding sludge treatment area
- SB-3 Adjacent to former UST 5 (No. 2 fuel oil USTs 5/5A)
- SB-4 Adjacent to former UST 5 (No. 2 fuel oil USTs 5/5A)
- SB-5 Adjacent to former AST cradles
- SB-6 Adjacent to Conrail railroad tracks
- SB-7 Adjacent to existing hazardous waste storage area
- SB-8 Within former UST basin 1 (No. 2 fuel oil UST 1)
- SB-9 Within former UST basin 2 (No. 2 fuel oil UST 2)
- SB-10 Within former UST basin 3 (No. 2 fuel oil UST 3)
- SB-11 Within former UST basin 4 (No. 2 fuel oil UST 4)
- SB-12 Within former UST basins 8 through 10 (No. 2 fuel oil USTs 8, 9, and 10)
- SB-13 Within former UST basins 8 through 10 (No. 2 fuel oil USTs 8, 9, and 10)

Soil encountered at the facility consisted mainly of medium brown to black silty sand with gravel (slag) fill material. Wood fragments were encountered along the western portion of the property, corresponding with the previous locations of railroad spurs that were formerly present on the property. Foundry sands also were identified in several of the borings. Native material, consisting of silty to sandy clay, was encountered in some borings ranging from a depth of 12 to 16 feet bgs.

The soils collected from each boring were field screened with a photoionization detector (PID) for volatile organic vapors. One soil sample was collected from each of the 13 soil borings. Samples were collected from the interval exhibiting the highest PID readings. If elevated PID readings were not recorded, a sample was collected from above the water table or collected at the boring termination, if no ground water was encountered. Nine of the samples (SB-1 through SB-7, SB-12, and SB-13) were submitted for analysis of VOCs and SVOCs. SB-7 also was analyzed for metals. Four of the samples (SB-8 through SB-11) were analyzed for SVOCs only.

Nine of the soil borings were converted to temporary groundwater monitoring wells (TW-1, TW-2, TW-3, TW-5, TW-6, TW-7, TW-11, and TW-12) (Appendix B: Figure 6 - Soil Boring and Temporary Well Location Map). Groundwater samples were collected from all of the wells, except TW-9 and TW-12, which did not yield sufficient amounts of groundwater for sampling. The groundwater samples collected from TW-1 through TW-7 were analyzed for VOCs and SVOCs. Groundwater samples from TW-3, TW-5, and TW-7 also were analyzed for total metals

(Note: only SB-7 soil was analyzed for metals. In addition, the report indicates that temporary well TW-3 was sampled for metals; however, the tabulated data and the discussion of the analytical results indicate that TW-2 was sampled for metals along with TW-5 and TW-7, not TW-3.) The TW-11 groundwater sample was analyzed for SVOCs only.

The soil analytical results were compared to the PADEP Statewide Health Standards NR MSCs for organic and inorganic substances in soil for used aquifers containing less than 2,500 milligrams per liter (mg/L) of total dissolved solids (TDS). The groundwater analytical results were compared to the PADEP groundwater NR MSCs for used aquifers containing less than 2,500 mg/L TDS.

Arsenic, barium, chromium, and lead were detected in soil sample SB-7 (collected at a depth of 10 to 12 feet bgs near the hazardous waste storage area) at the following concentrations:

- Arsenic 5.1 milligrams per kilogram (mg/kg)
- Barium 100 mg/kg
- Chromium 1,400 mg/kg
- Lead 14 mg/kg

According to the tabulated data included in the report, the concentrations of the detected metals were below the lower of the soil-to-groundwater NR MSCs (100 times the groundwater MSC), except chromium, which was above the highest of the soil-to-groundwater MSCs (generic value). Note that the soil sample was analyzed for total chromium, and the reported concentration was compared to the soil-to-groundwater MSCs for hexavalent chromium (CrVI).

VOCs detected in the soil samples included PCE, TCE, and cis-1,2-dichloroethane (DCE). SVOCs detected in the soil samples included anthracene, benzo(a)anthracene, chrysene, fluorene, fluoranthene, 1-methylnaphthalane, phenanthrene, and pyrene. The concentrations of the majority of the detected VOCs and SVOCs were below the lower of the soil-to-groundwater NR MSCs. However, PCE was detected above the soil-to-groundwater NR MSC at SB-12 (0.620 mg/kg at a depth of 18 to 20 feet bgs near fuel oil UST 8). In addition, benzo(a)anthracene (2.7 mg/kg) and chrysene (3.5 mg/kg) were detected above the lower of the soil-to-groundwater NR MSCs at SB-5 (depth of 10 to 12 feet bgs, located adjacent to the former AST cradles).

The results of groundwater samples collected from the temporary wells indicated that arsenic, barium, chromium, lead, and mercury were present in groundwater above the NR MSCs as shown on the following table:

Well Identification and Location	Parameter	Concentration micrograms/liter (µg/L)	NR MSC* (µg/L)
TW-1 Adjacent to fuel oil UST 7	Barium Lead Mercury	2,500 870 6.3	2,000 5 2
TW-2 Outside of the metal grinding sludge treatment area	Chromium Lead	880 230	100 5
TW-7 Adjacent to existing hazardous waste storage area	Arsenic Chromium Lead	65 13,000 2,600	50 100 5

*Non-residential used aquifer MSC, total dissolved solids less than or equal to 2,500 mg/L, as reported in LAC's Phase II report (note: NR MSC for arsenic was reduced to 10 µg/L on January 23, 2006).

No VOCs were reportedly detected in the groundwater samples. SVOCs were not detected in any of the groundwater samples except TW-11, located within former UST basin 4 (fuel oil UST 4). Fluorene (520 µg/L) and phenanthrene (590 µg/L) were detected at concentrations below the NR MSCs. A concentration of 1-methylnaphthalene (2,700 µg/L) also was detected; however, there was no PADEP MSC for this parameter at the time of the reporting. One SVOC was detected above the NR MSC, which was 2-methylnaphthalene at a concentration of 3,700 µg/L.

Based on the data collected during the Phase II investigation, LAC concluded that releases of hazardous materials (solvents) and petroleum constituents had occurred at the facility. LAC further concluded that the elevated concentrations of metals in soil and groundwater may be attributed to the reported historical dumping of slag on the property. LAC recommended the following further actions at the facility: (1) notifying PADEP of the findings of the subsurface investigation; (2) conducting further delineation of contamination in the form of additional sampling and/or site characterization to be determined by PADEP; and (3) possibly entering the property into the Voluntary Cleanup Program (Act 2).

Additional Groundwater Characterization (2006)

In March 2006, AES, conducted additional characterization activities for LAC to evaluate the technical and financial obligations that would be anticipated to move the facility through the Act 2 program and demonstrate attainment under the Special Industrial Area (SIA) standard. AES installed five 2-inch diameter groundwater monitoring wells to depths ranging from 20 to 30 feet bgs. The wells were installed in the following locations (Appendix B: Figure 7- Monitoring Well and Soil Vapor Location Map):

- MW-1 – East of former fuel oil USTs 8, 9, and 10
- MW-2 – South of former fuel oil UST 7
- MW-3 – Southeast of pad-mounted transformer
- MW-4 – Southeast of former fuel oil USTs 1, 2, 3, and 4
- MW-5 – Northeast of former fuel oil USTs 1, 2, 3, and 4

One round of groundwater samples was collected and the samples were analyzed for VOCs, SVOCs, and dissolved metals. VOCs detected in the groundwater samples included: n- and sec-butylbenzene, cis-1,2-DCE, and TCE. The detected concentrations were below the NR MSCs, except TCE, which was detected at a concentration of 5.14 µg/L in MW-3.

SVOCs detected in the groundwater samples included acenaphthene, benzo(g,h,i)perylene, fluoranthene, fluorene, 1-methylnaphthalene, naphthalene, phenanthrene, and pyrene. The majority of the detected parameters were below the NR MSCs except benzo(g,h,i)perylene at MW-2 (0.42 µg/L), MW-3 (0.31 µg/L), and MW-5 (0.42 µg/L).

Chromium was the only metal detected at dissolved concentrations in groundwater. Chromium was detected at MW-3 at 60 µg/L, below the NR MSC.

Based on the data collected by LAC and AES, AES recommended that NL Ventures pursue the SIA standard, which involved preparation and submittal to PADEP of a work plan for a baseline remedial investigation, preparation of a BER, submittal of a Notice of Intent to Remediate (NIR), and assistance with preparation of a COA. AES also recommended that NL Ventures conduct indoor air sampling, consider collecting a second round of groundwater samples, and prepare a final report to document the work performed under the COA.

BER Work Plan (2006)

On November 13, 2006, AES submitted the BER Work Plan under the Act 2 SIA standard to PADEP. The investigation work proposed in the work plan consisted of drilling soil borings in the AOCs, surface soil sampling (0 to 2 feet bgs) in to assess direct contact risks, installation of two additional monitoring wells, sampling the seven on-site monitoring wells, collecting two rounds of soil vapor samples from four soil vapor wells, and preparation of the BER report that would include an appropriate and relevant remediation plan for the site. PADEP approved the work plan on December 13, 2006.

Notice of Intent to Remediate (2007)

On May 30, 2007, on behalf of TAD and NL Ventures, AES submitted a NIR for the 18.62-acre property based on data collected by LAC and AES from 2006 through April 2007. The NIR indicated that soils on portions of the facility contained PCE, TCE, and chromium, and that groundwater underlying the facility contained TCE, vinyl chloride, benzo(g,h,i)perylene, 2-methynaphthalene, and pyrene as a result of historical industrial activities. The proposed future use of the property was non-residential for manufacturing.

According to the NIR, the facility intended to demonstrate attainment of the SIA standard for those constituents identified in soil and groundwater by one or more of the following: pathway elimination, in-situ stabilization, and/or institutional/engineering controls.

On May 31, 2007, PADEP acknowledged receipt of the NIR and replied with information regarding deed requirements, the consent order and agreement, and certain earth-moving restrictions to be implemented during remediation under Act 2.

Baseline Environmental Report (2007)

On September 20, 2007, the BER was prepared by AES and submitted to PADEP. The BER described the investigation activities conducted at nine AOCs identified at the facility to determine baseline soil, ground water, and soil vapor conditions. All work was done in accordance with the BER Work Plan approved by PADEP in December 2006.

Based on a review of historical documentation, nine AOCs were investigated, which included the following:

- AOC 1: Former USTs - Four fuel oil USTs (72,000 gallons, 74,000 gallons, 76,000 gallons, and 78,000 gallons) and one 1,000-gallon unleaded gasoline UST
- AOC 2: Former USTs - Two 20,000-gallon fuel oil USTs
- AOC 3: Former UST - One 1,000-gallon fuel oil UST
- AOC 4: Former USTs - Three 2,000-gallon fuel oil USTs
- AOC 5: Former ASTs and Current AST - One 20,000-gallon fuel oil AST, one 5,000-gallon fuel oil AST, one 10,000-gallon waste oil AST, one 5,000-gallon TCE AST, and one 5,000-gallon waste oil AST (existing)
- AOC 6: Former ASTs - Two 5,000-gallon waste oil ASTs
- AOC 7: Transformers
- AOC 8: RCRA Waste Area
- AOC 9: Landfill: Fill material (slag) covering entire property

In order to characterize the direct contact pathway for soil at the facility, a total of 27 soil borings were drilled to depths ranging from four to 10 feet bgs, and a total of 29 soil samples were collected and submitted for chemical analysis (Appendix B: Figure 8 - Soil Sampling Location Map). The following presents a discussion of the samples collected at each AOC and reports the compounds identified at each location above the applicable NR MSCs.

Two surface soil samples were collected at AOC 1. The surface soil samples were submitted for analysis of PADEP diesel/No. 2 fuel oil short list compounds. Four SVOCs were detected; however, none were detected above the NR MSCs. This is the same location where LAC collected subsurface samples SB-8, SB-9, SB-10, and SB-11 in 2006.

Three surface soil samples were collected at AOC 2. The surface soil samples were submitted for analysis of PADEP diesel/No. 2 fuel oil short list compounds. One SVOC was detected; however, the detected concentration was not above the NR MSCs. This is the same location where LAC collected subsurface soil samples SB-3 and SB-4 in 2006.

One surface soil sample was collected at AOC 3. The surface soil sample was submitted for analysis of PADEP diesel/No. 2 fuel oil short list compounds and VOCs. None of the compounds analyzed for were detected above reporting limits. This is the same location where LAC collected subsurface soil sample SB-1 in 2006.

No soil samples were collected at AOC 4 by AES. According to a response to comments from AES to PADEP dated December 5, 2007, soil quality at AOC 4 was evaluated using groundwater data from existing monitoring well MW-1. The BER explains that subsurface soil samples (SB-12 and SB-13) collected by LAC in 2006 from this AOC indicated the presence of PCE and TCE above the soil-to-groundwater NR MSCs; however, groundwater data for MW-1 indicated that PCE was not present in groundwater. In addition, AES noted that while nine SVOCs were detected in the MW-1 groundwater samples (none above the NR MSCs), none were detected in the subsurface soil samples collected by LAC in 2006.

AES collected five surface soil samples at AOC 5, and submitted them for analysis of diesel/No. 2 fuel oil or waste oil short list compounds in addition to VOCs. Two of the surface samples contained PCE above the soil-to-groundwater NR MSC, and three of the surface soil samples contained TCE above the soil-to-groundwater NR MSC. Three SVOCs were detected above laboratory reporting limits, but below the applicable NR MSCs. This is the same location where LAC collected subsurface soil sample SB-5 in 2006.

Two surface soil samples were collected at AOC 6. The samples were submitted for analysis of PADEP waste oil short list compounds. PCE, three SVOCs, and lead were detected in one or both of the samples above reporting limits, but below the NR MSCs. TCE was detected in both samples; however, TCE only exceeded the soil-to-groundwater NR MSC in one of the samples.

AES collected two surface samples and two subsurface soil samples at AOC 7 and submitted them for analysis of PCBs. PCBs were not detected above laboratory reporting limits.

Two surface soil samples were collected at AOC 8 and submitted for analysis of VOCs, SVOCs, and metals. PCE and TCE were detected above the soil-to-groundwater NR MSCs in both samples. Cis-1,2-DCE, 18 SVOCs, and five metals were detected above laboratory reporting limits, but below their respective MSCs. Total chromium was detected above the soil-to-groundwater NR MSC in both samples; however, the detected concentration was compared to the

NR MSC for hexavalent chromium (CrVI). This is the same location where LAC collected subsurface soil sample SB-7 in 2006.

Ten (10) samples of the fill materials were collected throughout the site. The samples were analyzed for PCBs and RCRA metals. No PCBs were detected above laboratory reporting limits. Seven metals were detected above reporting limits, but below the applicable NR MSCs. One sample contained a concentration of total chromium that exceeded the direct contact NR MSC for hexavalent chromium. A second sample was collected and analyzed for hexavalent chromium. The detected concentration was below the direct contact NR MSC.

During additional investigation activities conducted in March 2006, AES installed five shallow groundwater monitoring wells (MW-1 through MW-5) downgradient of AOCs identified at the facility. During the baseline environmental investigation conducted in January through April 2007, AES installed three additional shallow groundwater wells (MW-6, MW-7, and MW-8). MW-6 was installed to further characterize groundwater in AOC 1. MW-7 was installed within AOC 5, northeast of AOC 2, to further characterize groundwater in the vicinity of these areas. MW-8 was installed downgradient of MW-6 to determine the extent of separate phase liquids (SPL) observed in MW-6. MW-6 and MW-7 were installed in January 2007, and MW-8 was installed in May 2007.

Groundwater samples were collected from the monitoring well network in January and April 2007. The samples were submitted for the analysis of VOCs, SVOCs, PCBs, and metals. No VOCs were detected at MW-1, MW-4, MW-7, or MW-8. TCE and vinyl chloride were detected in several wells at concentrations exceeding the NR MSCs, which were 5 µg/L and 2 5 µg/L, respectively. TCE was detected at MW-2 (15.3 µg/L), MW-3 (5.14 µg/L), and MW-5 (5.2 µg/L). Vinyl chloride was detected at 2.1 µg/L at MW-5.

SVOCs detected in the monitoring wells above the NR MSCs included 2-methylnaphthalene (5,620 µg/L), phenanthrene (1,690 µg/L) and pyrene (157 µg/L) at MW-6; and benzo(a)pyrene (0.24 µg/L) and benzo(g,h,i)perylene (0.79 µg/L) at MW-8. Groundwater from MW-6 also contained detectable concentrations of dibenzofuran and 1-methylnaphthalene that do not have MSCs, nor do they have corresponding life time health advisory levels, which could otherwise serve as the MSC.

One PCB, Arochlor 1254, was detected at 0.34 µg/L at MW-6 located near the former pad-mounted transformer; however, this was the only PCB detected in any monitoring well on-site and the concentration was below the 1.4 µg/L NR MSC for this compound.

Arsenic (MW-5), hexavalent chromium (MW-1 and MW-3), and zinc (MW2) were detected during one or both sampling events above laboratory reporting limits, but below their respective NR MSCs.

In addition to the dissolved SVOCs, SPL was observed in MW-6 during the first sampling round (Appendix B: Figure 7 - Monitoring Well and Soil Vapor Location Map). SPL was not observed during drilling/installation of the well. In April 2007, AES collected a sample of the SPL, which was identified by fingerprint analysis as diesel/ No.2 fuel oil. AES initiated interim remedial action to recover the SPL from MW-6, removing approximately two gallons from the well using a bailer. The SPL was bailed until no appreciable thickness was observed. It was determined that the SPL was not associated with a recent release, and was likely to have occurred prior to the mid-1980s, related to a release from the concrete heating oil USTs (USTs 1, 2, 3, and 4) that were present in the area. SPL was not observed in the surrounding monitoring wells and the analytical results of these wells did not exhibit elevated concentrations of dissolved SVOCs. Therefore, AES concluded that the SPL was confined to the area of the former UST excavation. AES further concluded that the presence of SPL did not represent an immediate, direct, or imminent threat to public health or the environment given that there is a mandatory connection ordinance for potable water; the SPL was located at depth; and it was not mobile.

In April 2006, AES installed four soil vapor wells at the facility to evaluate the potential that constituents of concern in soils had affected indoor air quality for the occupied on-site structures (Appendix B: Figure 7 - Monitoring Well and Soil Vapor Location Map). The soil vapor wells were installed in AOC 1 (VP-4), AOC 3 (VP-1), AOC 4 (VP-3), and AOC 5 (VP-2), and were constructed using 0.25-inch diameter perforated tubing and PVC casing. Each well was five feet deep, and the perforated intervals extended from 3.5 feet to 5 feet bgs. (Note: On Appendix B: Figure 7 - Monitoring Well and Soil Vapor Location Map of the BER, the vapor wells are label as SV-1, SV-2, etc., rather than VP-1, VP-2, etc., as described in the report narrative.)

Two rounds of soil vapor samples were collected (April and May 2007). Soil vapor samples were submitted for analysis of VOCs (USEPA Method TO-15) and naphthalene (NIOSH Method

5515). Benzene; toluene, PCE; 1,2,4-trimethylbenzene; 1,3,5-trimethylbenzene; TCE; cis-1,2-DCE; Freon 11; Freon 12; 1,1,1-trichloroethane were detected in the soil vapor samples above laboratory reporting limits; however, none of the detected concentrations exceeded the NR soil vapor screening values (transfer factor of 0.01 applied to the PADEP indoor air screening values listed in Table 3 of the PADEP *Final Guidance on Vapor Intrusion into Buildings from Groundwater and Soil Under the Act 2 Statewide Health Standards*).

According to the BER, the results of the soil characterization indicated that no immediate, direct, or imminent threats were present in the soils of the investigated AOCs. None of the target compounds were detected above their respective direct contact NR MSCs in any of the soil samples; therefore, no further remedial measures were proposed for soil other than the filing of a deed restriction in accordance with 35 P.S. Section 6026.305 (Land Recycling Act, "Act 2"). The language included in the deed restriction would require that all impervious surfaces be maintained.

AES concluded that the presence of VOCs and SVOCs above the NR MSCs in five of the eight monitoring wells (MW-2, MW-3, MW-5, MW-6, and MW-8) and the presence of SPL at MW-6 did not pose an immediate, direct, or imminent threat given that the rules and regulations of the Harrisburg Authority mandated buildings located within 200 feet of the city water supply be connected to the system. In addition, AES concluded that the SPL did not pose an immediate, direct, or imminent threat because the liquid was at depth and was composed substantially of the low-solubility remnants, which were not mobile. Therefore, no further remedial measures were proposed for groundwater other than the filing of a deed restriction in accordance with 35 P.S. Section 6026.305. The language in the deed restriction would require that groundwater not be used for drinking or agricultural purposes at the site.

AES also evaluated the groundwater discharge to surface water (Paxton Creek) pathway using fate and transport modeling software (SWLOAD5B). The results of the fate and transport modeling indicated that no additional modeling was necessary (PENTOX), and AES concluded that the groundwater discharge to surface water pathway was incomplete.

According to the BER, the data collected during the soil vapor investigation indicated that the vapor intrusion pathway did not constitute a concern for the facility; therefore, AES considered the soil vapor pathway incomplete. Compounds identified in soil vapor did not exceed NR soil

vapor screening values, and did not pose an immediate, direct, or imminent threat; therefore, no further remedial measures were proposed for soil vapor.

PADEP acknowledged receipt of the BER on September 27, 2007 and provided comments to AES on November 16, 2007. AES responded on December 5, 2007, and PADEP approved the BER on December 10, 2007. Based on the findings of the BER, TAD and NL Ventures obtained liability protection afforded under Act 2 for the constituents of concern (TCE, vinyl chloride, benzo(a)pyrene, benzo(g,h,i)perylene, 2-methylnaphthalene, phenanthrene, and pyrene) characterized at the property under the SIA standard. Note that the BER indicated that the elevated concentrations of the SVOCs detected at MW-6 raised the reported detection limits of some compounds above the NR MSCs; therefore, additional SVOCs may be present at MW-6 above the NR MSCs, although the analytical data reported these compounds as not detected. PADEP comments to the BER (dated November 16, 2007) indicated that characterization for those specific compounds would be considered incomplete, and relief of liability would not be extended to those compounds. AES responded on December 5, 2007 that because the laboratory detection limits were met for all SVOCs analyzed in MW-8 (located approximately 30 feet east of MW-6, in the interpreted direction of groundwater flow), the MW-8 data is representative of AOC 1 and relief of liability should be granted for all SVOCs detected in AOC 1. Also note that a relief of liability was not requested for metals identified at the site because, according to AES, the presence of metals was likely related to the deposition of fill materials (slag and foundry sands) used to abandon the former canal, rather than to former industrial operations conducted on-site.

Consent Order and Agreement (2008)

A COA was entered on July 11, 2008 between PADEP, TAD, and NL Ventures. The COA stated that NL Ventures and TAD did not cause or contribute to the contamination identified at the property, the parties intended to reuse the facility for non-residential industrial and commercial purposes, and that the property is not intended for residential use. Furthermore, the COA outlined the chain of title for the property and summarized the results of the September 2007 BER that was made part of the COA by reference. Furthermore, NL Ventures and TAD were not subject to remedial obligations, as long as the identified contamination did not prevent the occupation of the property for its intended purpose, since no immediate, direct, or imminent threats were identified.

The COA required that an Environmental Covenant be executed and recorded by NL Ventures and TAD that documents the occurrence of groundwater concentrations that exceed the NR MSC, the occurrence of SPL, prohibits the installation of on-site water supply wells, and requires the maintenance of the property's impervious cover.

Environmental Covenant (2008)

On November 5, 2008, the Environmental Covenant, executed pursuant to the Pennsylvania Uniform Environmental Covenants Act (UECA), Act No. 68 of 2007, 27 Pa. C.S. Sections 6501 – 6517, was recorded in the Dauphin County Courthouse. Certain key excerpts from the Environmental Covenant are as follows:

> "The Property is subject to the following activity and use limitations, which the Owner/Holder and each subsequent Owner/Holder of the Property shall abide by: (1) the groundwater at and under the Property shall not be used for any drinking or agricultural purpose without treatment; (2) the Property shall be used solely for nonresidential purposes; and (3) Grantee shall have a continuing duty to maintain the pavement caps/and or structures overlying the fuel oil SPL on the Property . . . and shall not allow any excavations of an approved cap without prior written notice and a plan submitted to the Department or successor with a schedule of implementation setting forth worker health and safety requirements, access limitations during excavations, and restoration of the cap or other alternatives that are approved by the Department in writing.
>
> In order to maintain the liability relief of Act 2 for areas of the Land subject to a protective cover, where the cover is breached or removed, remaining soils or other materials where such excavation or removal occurs ("Area") shall either meet: (1) applicable statewide health standards or numeric based site specific standards approved by the Department in writing and all applicable federal, state and local laws, regulations and ordinances pertaining to the environment and occupational safety; or (2) be covered with materials that eliminate the pathway of exposure to the underlying contamination and is capable of physically supporting the intended use of the Area. Such alternative cover shall be placed on the Area within such period of time as set forth in the worker health and occupational safety plan developed with respect to such Area as approved by the Department. The alternative cover shall thereafter be maintained by the Land owner in good and proper repair.

All excavated materials removed from the Land shall be managed, transported and disposed of in compliance with all applicable federal, state and local laws, regulations and ordinances including, without limitation, those pertaining to environmental protection and occupational safety."

The Environmental Covenant also requires a periodic compliance reporting requirement, as follows:

"By the end of every third January following the effective date of this Environmental Covenant, the Owner and each subsequent owner shall submit, to the Department and any Holder . . . , written documentation stating whether or not the activity and use limitations in this Environmental Covenant are being abided by. The Owner and each subsequent owner shall submit, to the Department and any Holder . . . , written documentation following transfer of the property, concerning proposed changes in use of the property, filing of applications for building permits for the property or proposals for any site work affecting the contamination on the property subject to this Environmental Covenant."

Department of Environmental Protection's Motion for Leave to Intervene (2009)

On March 25, 2009, PADEP conducted a hazardous and residual waste inspection at the facility. On May 15, 2009, PADEP sent a letter to the facility regarding its findings and expressing concern regarding the quantity of residual and hazardous wastes remaining at the facility in light of the then state of slowing plant operations. The letter requested that the facility immediately address all existing violations related to lack of labeling and covers on residual waste containers and the lack of documented inspections. Furthermore, the letter requested that the facility provide a contingency plan documenting provisions and financial ability for disposal of all plant waste prior to final shutdown.

During PADEP's September 24, 2009 site visit, large quantities of wastes continued to be present, including leaking oily sludge containers. On September 24, 2009, following the discovery that TAD was potentially bankrupt, and was likely to not address its waste management responsibilities, PADEP filed a civil action motion in the United States (US) Middle District Court. PADEP requested the Court intervene and determine the liability for the wastes remaining at the facility. On October 9, 2009, following a conversation between PADEP and officers of

TAD, the officers of TAD agreed to perform certain actions to address immediate environmental concerns, including: removal of a leaking rolloff and cleaning of the resultant spill; placing covers on all open drums; securing all entry doors to the facility; and repairing and maintaining the electric gate to control unauthorized access to the facility.

During a follow-up site visit conducted by PADEP on October 21, 2009, PADEP observed that the majority of the actions were not completed, although the gate was being repaired, which was believed to have been initiated by Textron (the lessor of the equipment remaining at the facility). In addition, Textron had retained the services of a former TAD electrician who assisted PADEP with securing the facility's entry doors. PADEP also observed additional chemical and waste storage areas located within the building and noted that oil was leaking from some of the machinery that should be immediately addressed.

A waste removal contractor, Waste Management of Pennsylvania, Inc. (WM), arrived on-site during PADEP's October 21st site visit to remove the outside rolloff containers containing wastewater filtercake and spent grinding wheels. PADEP noted that WM dumped the waste on the ground prior to removing the containers from the site. PADEP contacted WM who hired an independent contractor to cleanup the dumped materials. PADEP subsequently issued a consent assessment of civil penalty to WM on January 19, 2010.

Inspections

Waste

On March 10, 1982, violations regarding labeling, marking, and placarding were noted. Containers did not meet DOT requirements. A PPC plan was required to be developed. Minor deficiencies in TRW's Part A application were noted. Violations during the inspection were as follows: the solid sodium hydroxide (NaOH) waste stream was not analyzed for EP toxicity, which the facility had notified incorrectly as F011; the facility did not have a waste analysis plan; treatment and storage areas did not have the required safety posting and signage; no inspection schedule for the treatment and drum storage areas was present and no inspection was being conducted; no personnel training program existed and no records were being maintained; no contingency plan was in existence; and no written operating record, closure plan or closure cost estimate was present. The inspection report further notes that approximately 1,500 drums were

stored on-site, some in excess of one year. In addition, PADEP observed leaking drums of Safety Sol 24 (containing approximately 15 percent PCE and 85 percent aliphatic hydrocarbons) during the inspection, and instructed TRW to transfer all contents to containers in good condition and excavate all contaminated soil/stone.

On August 11, 1982, PADEP sent a follow-up letter to TRW regarding an update of the facility's actions following the March 10, 1982 inspection. The letter indicates the leaking drums of solvent were removed. The soil beneath the drums was removed to a depth of approximately 1.5 feet until slag was encountered. Much of the contaminated soil (approximately 500 tons based on TRW's September 30, 1982 quarterly hazardous waste report) and other material were disposed of as hazardous waste; however, a large pile of excavated material remained adjacent to the excavated area. The facility planned to place a 40 foot by 80 foot concrete pad over the excavated area and continue to use it for storage of solvents. Hazardous waste signs were posted at the solvent storage area.

The February 25, 1983 inspection report noted that 4,000 gallons per quarter of spent acid and 3,000 gallons per quarter of waste solvents (D002, D007, F001, F005) were generated at the facility. It was noted that TRW was had remedied the violations cited on March 10, 1982. Spent alkali and acid were shipped offsite for treatment. The facility reportedly was planning to construct a wastewater treatment system in 1984, which was later operated under PBR. No additional violations were noted during this inspection.

The December 6, 1983 inspection report noted that 700 gallons per month of PCE and Safety Sol 24 waste were being generated by the facility. The report also noted the following hazardous wastes were generated by the facility: 1,1,1-TCA (F001), methyl ethyl ketone (MEK) (F005), waste acids (D002), and caustic sludges (D007). Alkaline/corrosive wastes were being stored adjacent to organic wastes and may be incompatible. It was recommended that the wastes be tested for compatibility or otherwise should be stored segregated. In addition, records of employees who handle hazardous waste should be maintained. No violations were noted.

On August 20, 1987, F001 and F005 wastes being produced totaled 1,110 kilograms per month. Comments noted in the inspection report included: (1) an inspection schedule for the wastewater treatment system was present but no records were visible for inspection, and (2) the PPC plan

should be updated when the wastewater treatment system became operational. No violations were noted.

On September 15, 1987, no violations were noted.

According to the June 21, 1989 inspection report, Chromalloy was generating 1,500 kilograms per month of F001 wastes (1,1,1-TCA degreaser solvent and PCE/naptha mixture solvent) and 800 kilograms per year of F002 wastes (Freon). The inspection further notes that documentation for personnel training program was not found; however, no violations were noted.

The August 14, 1991 inspection report indicates that Chromalloy was generating 1,000 kilograms per month of F001 wastes (vapor degreaser) and 7,500 kilograms per year of F002 wastes (parts washer). The PBR waste water treatment system was in operation and was used to treat wastewater from the acid etch tanks and floor spills. It was noted that effluent from the wastewater treatment system was discharged to the Harrisburg Publicly Owned Treatment Works (POTW). No violations were noted.

On September 28, 1992, the facility was generating 1,000 kilograms per month of F001 wastes (vapor degreaser) and 8,500 kilograms per year of F003 and F005 wastes (parts washers). No violations were noted.

The September 28, 1994 inspection report noted the generation of less than 1,000 kilograms per month of F002 (waste solvents including 1,1,1-TCA), and F003 and F005 wastes (MEK). Diesel fuel (D002) also was disposed of off-site. Source reduction had been accomplished for the facility. According to the inspection report, Chromalloy continued to be listed as a TSD facility, but was no longer operating as such. The facility was reportedly operating as a LQG, although certified closure of the hazardous waste storage pad had not been completed. The majority of the wastes generated were waste solvents associated with the milling and drilling area and the blade machining area. The drums of waste were stored on the hazardous waste storage pad, which was sectioned off with a fence that separated product from waste materials. No violations were noted.

According to the March 5, 1997 inspection report, the facility continued to generate less than 1,000 kilograms per month of F002, F003, and F005 wastes. A facility representative explained that the rate of hazardous waste production had been reduced due to replacement of various

solvents and degreasers. However, significant quantities of acidic wastewater continued to be generated from the acid etch operations, and was treated using the PBR wastewater treatment system. Chromalloy occasionally generated/accumulated off-spec wastes that were shipped offsite for disposal. No violations were noted.

The September 22, 1998 inspection report indicates that the facility was generating approximately 1,000 kilograms per month of D001, D002, and D003 waste corrosive liquids. Violations observed during the inspection included: containers of hazardous wastes were stored in without lids, caps, dates of accumulation, or labels indicating waste type; coating wastes had accumulated on the ground at the coating baghouse and at the coating waste rolloff container; drums of waste located near the sandblasting baghouse were not labeled and were without lids. A re-inspection would be conducted within 30 days of the inspection to determine whether the violations had been mitigated.

PADEP conducted the re-inspection on November 18, 1998 and observed that all drums were provided with lids and the baghouse dust and coating wastes that had accumulated on the ground were cleaned up. Waste filters observed during PADEP's September 22 inspection were determined to be non-hazardous, and therefore could be disposed of as residual waste. PADEP recommended analysis of all undetermined waste streams prior to disposal. All violations observed during the September 22 inspection were addressed. Therefore, the facility was determined to be in compliance, and no further action was required.

According to the March 20, 2001 inspection report, approximately 28 pounds of waste acetone was generated per month. No wastes were stored at the time of the inspection. Chromalloy was listed as LQG, but facility intended to notify USEPA concerning their change of status to a SQG. No violations were noted.

The November 8, 2004 inspection report indicates that TAD was generating approximately 180 pounds per month of wastes, including D001 (waste acetone and isopropyl alcohol), D002 (waste sodium and potassium hydroxide and waste sodium metasilicate and carbonate), and U069 (waste dibutyl phthalate). No violations were noted.

On March 25, 2009, an inspection was conducted at the facility, which was listed as a CESQG. TAD was generating approximately 220 pounds per month of waste acetone. Two satellite

collection points were observed, one containing spray/aerosol cans and the other containing two five-gallon buckets of waste acetone. Liquid was observed leaking over the edge of the flocculation tank in PBR wastewater treatment system room. PADEP recommended that the facility adjust the mixer to prevent spilling of waste into the containment area. No violations were noted related to generation/storage of hazardous wastes; however, during the residual waste inspection conducted by PADEP on the same day, waste grinding wheels, oily waste, wastewater filtercake, and spent coating powder were present in containers/rolloffs that were uncovered or unlabeled. Violations related to the mismanagement of these wastes as well as failure to file required reports (i.e., biennial reports and Forms 25R and 26R) and maintain inspection records for residual waste storage areas were noted in the inspection report. The violations and ensuing follow-up actions are discussed in detail in sections *SWMUs and AOCs Identified During Recent Investigations (2007-2009)* and *Investigations and Remedial Actions to Date*.

Air

Air quality inspections were conducted from 1977 through 2008. Equipment associated with air emissions included the following sources: sandblasting and related operations, plasma spray system, electrical discharge machining operation, acid etch operation, heat treat furnaces, degreasers, and combustion units. On the following inspection dates, no violations were noted on the inspection reports: November 29, 1977; September 8, 1983; April 16, 1984; October 10, 1984; April 8, 1985; December 15, 1987; May 2, 1988; November 14, 1988; November 29, 1989; April 10, 1990; October 25, 1990; February 14, 1991; October 8, 1991; February 13, 1992; November 4, 1992; March 22, 1994; June 27 1994; March 21, 1995; August 14, 1995; May 15, 1996; May 9, 1997; April 13, 1999; November 18, 1999; December 14, 1999; November 7, 2000; December 14, 2001; May 2, 2003; July 15, 2004; July 26, 2005; July 25, 2006; July 10, 2007; and October 27, 2008. The following paragraphs summarize violations and significant comments that were noted on the inspection reports.

During the April 20, 1981 inspection, it was observed that one of the Slyblast dust collection units had been operating although operation of the unit had been suspended until it was repaired. In addition, PADEP observed two other Slyblast units and found these units to be in disrepair (visible emissions were observed emanating from one of the exhaust ducts to the outside air). PADEP informed TRW of the violation and subsequently issued a NOV on May 12, 1981. A September 16, 1981 follow-up inspection revealed the Slyblast units were operating properly.

The April 5, 1982 inspection report indicates that fugitive emissions were emanating from the powder blending machine. A NOV was issued to TRW for the violations on April 19, 1982. The inspection report also indicates that a letter to revoke operating permit 27-399-003 would be sent to TRW since this equipment (electrolytic machines) were removed.

On September 9, 1982, two sources, the Detrex vapor degreaser and the Baron Blakeslee vapor degreaser, were not operated properly. The operator of one of the degreasers was not following proper operating procedures, and the covers of both degreasers were not closed when not in operation. The inspection report indicated a NOV would be issued and an abatement conference would be scheduled with TRW.

On March 30, 1983, similar violations were observed regarding the operation of the vapor degreasers. In addition, one of the vapor degreasers did not have a cover. PADEP indicated that the violations were minor and no enforcement action was recommended.

According to the inspection report dated October 17, 1985, the operating permit for the plasma spray system was suspended pending submittal of a new plan approval application. A NOV would be issued regarding the installation of a baghouse without prior plan approval and subsequent operating of the baghouse without a permit. The report further indicated that a settlement agreement would be drafted for no less than $3,000 since as TRW was historically indifferent to submitting timely applications for its air sources.

A February 4, 1986 inspection report indicates that a meeting would be held with TRW because it continuously installed and operated equipment faster than PADEP could complete the required permit. According to the report, TRW had installed 17 EDM machines without prior plan approval.

The April 24, 1986 inspection report states that because of the February 3, 1986 fire that destroyed the TRW plant, outstanding violations were forgiven.

During the inspection conducted on May 29, 1987, Chromalloy was cited for installing a dust collector without prior plan approval.

On May 24, 1989, the Micropul baghouse was out of compliance. Five electrical discharge machines were added without a plan approval. It was noted that a NOV would be issued for the violations. A history of installing equipment without submitting plan approvals also was noted. PADEP indicated that it would conduct the next inspection in late afternoon or after hours such that the plasma spray operations could be observed. Complaints received from workers about "the plant next door" (not specified) reportedly were received.

The October 25, 1990 inspection report indicated that all degreasers were now using 1,1,1-TCA.

On October 8, 1991 a new baghouse was installed. The control device could no longer be bypassed.

The November 4, 1992 inspection report indicated that Chromalloy was making plans to replace the 1,1,1-TCA degreasers, and that the forging operations had been discontinued.

On June 27, 1994, one electrochemical drilling machine and one plasma spray booth were removed.

On March 21, 1995, no violations were noted. The Plasma spray booth PEDS 129 was removed, and all of the old forge shop operations were also removed.
On May 15, 1996, all vapor degreasers used for production were removed from service with the last degreaser removed in August 1995. Parts cleaning for production were now accomplished using caustics and water. Two Safety-Kleen units continued to be used. Approximately 55-gallons of solvent were used per year. Emissions were not significant to warrant annual reporting.

On May 9, 1997, a malfunction of a pressure transducer within the scrubber located in the acid etch area was noted. A May 30, 1997 follow-up letter from Chromalloy to PADEP indicated that certain corrective measures were in place to repair the transducer.

The November 7, 2000 inspection report indicated that all boilers ceased operation and both were for sale. It was also noted that the facility was operating a very low production levels, which continued until the facility (under TAD) closed in 2009.

NPDES

NPDES outfall inspections were conducted from 1991 through 1996.

On February 5, 1991, only Outfall 001 (contact and non-contact cooling water) was discharging to Paxton Creek. The other seven outfalls were dry.

On September 25, 1991, the pH in Outfall 001 was 5.2 standard units (s.u.) and Outfall 004 (non-contact) was 4.97 s.u., both below the permit limit of 6.0. It was noted that discharges were observed from Outfalls 002 (non-contact and contact) and 004, which typically had no flow. A trickle of flow was observed at Outfall 005 (contact and non-contact), which was attributed to recent significant precipitation.

On September 24, 1992, confusion over outfalls and pipe numbers was noted. Discharge from Outfall 001 was noted to be clear. No discharges were observed from Outfalls 002, 003 (non-contact), 004, and 005. It was noted that surface water upstream and downstream was light brown and cloudy.

On September 14, 1993, the discharge from Outfall 001 was clear with a slight organic odor. No discharges were observed from Outfalls 002 through 005.

On May 5, 1994, the discharge from Outfall 001 was clear, and no foam or odors were observed. No discharges observed from Outfalls 002 through 005.

On January 27, 1995, forging operations which contributed non-contact cooling water to outfall 004 had ceased approximately one year prior to the inspection date. Therefore, Outfall 004 was no longer receiving any process or cooling water, but reportedly may have been receiving some stormwater. Operations conducted at the facility included finish machining and coating for jet engine parts. Two sinks located in the south end of the building contributed to Outfall 001. The purpose of the sinks was reportedly to wash parts after they had been coated with aluminum or chrome powers and baked. However, the inspection report indicated that the sinks also received non-contact cooling water from the adjacent 1,1,1-TCA vapor degreasers. In addition, parts removed directly from the vapor degreasers had occasionally been washed in these sinks. The water in the sinks was clear at the time of the inspection. The discharge from Outfall 001 also

was clear with no organic odor or sheen. The report also noted that Chromalloy did not properly convert laboratory data for its October 1994 outfall VOC samples, and the results reported on the DMR were incorrect.

On March 6, 1995, the discharge from Outfall 001 was clear and odorless. Surface water upstream and downstream of the facility appeared greenish and turbid. The January 1995 inspection report indicated the facility was planning to replace the TCA vapor degreasers with a closed-loop parts washing system that used soap and water. The March 1995 inspection report indicates the new system may be in place by the end of 1995.

On September 18, 1995, the discharge from Outfall 001 was clear. The inspection report indicated that the processes which once contributed to Outfall 004 (rotary furnace and induction heater) were eliminated. Therefore, the only discharge to Outfall 001 was stormwater.

On March 25, 1996, process wastewater had been removed from Outfall 001. Minor discharges (pH 6.89 s.u. and temperature 12.5°C) observed at the outfall appeared to be groundwater. There was no discharge of process water or stormwater from pipes into the manhole inside facility at Outfall 101 (outfall 101 process water was collected in a sump and used as boiler make-up water). Minor dripping of washwater from the parts washing area into the 101/001 manhole was observed, which the facility agreed to correct.

C. Description of Exposure Pathways for all Releases or Potential Releases

Air: According to the US Census Bureau (www.factfinder.census.gov, accessed June 9, 2010), the population of the City of Harrisburg was approximately 48,950 in 2000 (estimated to be 47,148 for 2008). In the past, the facility operated several permitted air sources, for which several NOVs were issued for visible emissions. However, the facility is no longer operating at the location; therefore, the outdoor air exposure pathway is considered incomplete at this time.

Detectable concentrations of VOCs and SVOCS are present in the soil and groundwater at the facility, some at concentrations exceeding the NR MSCs. In addition, SPL identified as No. 2 fuel oil is present on the groundwater table at MW-6. Therefore, the vapor intrusion exposure pathway is relevant.

Groundwater: According to the BER, shallow groundwater is present within the alluvial materials underlying the site. The shallow water table ranges in depth from 9.5 to 20.8 feet bgs. The static water levels are reportedly seasonably and storm-event influenced (AES, 2007). The interpreted groundwater flow direction underlying the 18.62-acre subject facility is west to east, toward Paxton Creek. Deeper groundwater (bedrock) was not investigated; however, as reported in the RFA (1989), groundwater in the underlying bedrock it is expected to occur in secondary interconnected openings (steeply dipping joints/fractures) that underlies the facility. Groundwater is not expected to occur in primary openings (void spaces between individual grains of the rock) as the underlying rock is predominately shale and limestone.

The facility and surrounding area are supplied public water by the Harrisburg Authority. The Harrisburg Authority obtains its water primarily from the Dehart Reservoir located approximately 15 miles northeast of the facility. The Harrisburg Authority's secondary water supply (if required) is via the Susquehanna River. The location of the intake on the Susquehanna River is unknown. According to the BER (2007), the rules and regulations of the Harrisburg Authority require that any buildings located within 200 feet of the city water supply must be connected to the system, and no other water supply may be used.

Information obtained from the Pennsylvania Department of Conservation and Natural Resources (PA DCNR) Groundwater Information System (PaGWIS) (accessed June 10, 2010), indicates that four groundwater wells are located within 0.5 miles of the facility. These include the following (locations are based on coordinates obtained from the PaGWIS database):

- One 50 foot deep well identified as an industrial well located at a gas station approximately 0.3 miles southwest of the facility (installed in September 1987)
- Two 20 foot deep wells identified as monitoring wells located on the Capital Area Transit property approximately 0.3 miles southeast of the facility (installed December 1992)
- One 100 foot deep industrial withdrawal well located approximately 0.1 mile east of the facility (owner identified as Velruss Ice Cream Company, no installation date)

Surface Water: Paxton Creek lies directly east of the facility. Stormwater runoff from the facility's roofed areas is directed to drains that are connected to internal and external leaders. The leaders ultimately discharge into the municipal stormwater system. Surface runoff at the facility is directed via sheet flow towards Paxton Creek.

Paxton Creek is designated as a warm water fishery as defined in Title 25, Chapter 93 (Water Quality Standards) of the Pennsylvania Code. Paxton Creek is also identified as a tentative non-attaining segment on the streams integrated list according to the Clean Water Act, impaired for aquatic life resulting from suspended solids, water/flow variability, and habitat alterations from urban runoff/storm sewers; and dissolved oxygen/biological oxygen demand from combine sewer overflow. There are no extensive wetlands associated with Paxton Creek, according to the BER (2007). Paxton Creek flows in a southerly direction to its confluence with the Susquehanna River, approximately 2.5 miles south of facility.

Soil: According to the BER (2007), the facility is predominately underlain by the Urban Land soil type, which is described as soils that have been disturbed and covered with impervious layers consisting of buildings, pavement, sidewalks, and streets. Soil boring and monitoring well logs for investigations conducted in 1986, 2006, and 2007, indicate that the subsurface materials consist primarily of fill (slag) to depths ranging from 12 to 15 feet bgs. Native soils consisting of silty and sandy clay and gravel (alluvium) underlie the fill materials.

D. Exposure Pathway Controls and/or Release Controls Instituted at the Facility

Air: Although several NOVs were issued to the facility under TRW's management, the facility is no longer operational.

USEPA has requested that the vapor intrusion pathway be evaluated as part of the EI process. The USEPA 2002 OSWER *Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance)* provides a methodology for vapor intrusion evaluation under current land use conditions using available site data. It should be noted that the USEPA 2002 guidance is not generally recommended for use in evaluating settings that are primarily occupational. However, the PADEP Act 2 vapor intrusion guidance (specifically, *Land Recycling Program Technical Guidance Manual – Section IV.A.4, Vapor Intrusion into Buildings from Groundwater and Soil under the Act 2 Statewide Health Standard*) can be applied to both residential and nonresidential receptors. This guidance provides decision matrices for soil and groundwater (under a Statewide health or generic approach) for determining if indoor air quality is a concern. Therefore, the PADEP vapor intrusion guidance was used, as appropriate, to evaluate a potential vapor intrusion pathway in this EI Report.

As previously discussed, VOCs and SVOCs were detected in surface soil samples collected from the majority of the AOCs investigated in 2007. None of the detected concentrations in soil exceeded the NR MSCs; however, the samples were collected from depths of less than five feet bgs. Several VOCs and SVOCs were identified in groundwater in five of eight monitoring wells installed at the facility above the NR MSCs, including TCE, vinyl chloride, benzo(a)pyrene, benzo(g,h,i)perylene, 2-methylnaphthalene, phenanthrene, and pyrene. In addition, SPL (identified as No. 2 fuel oil) was detected in monitoring well MW-6.

A vapor intrusion evaluation was conducted at the facility in accordance with the PADEP Act 2 vapor intrusion guidance. AES installed four soil vapor points and collected two rounds of samples (AES, 2007). The samples were analyzed for VOCs and naphthalene based on identified constituents of concern in site soils. The analytical results for the samples indicated that while VOCs were detected, none of the reported concentrations exceeded the soil vapor NR screening values (indoor air MSCs multiplied by a transfer factor of 0.01). The PADEP-approved BER (AES, 2007) concluded that the vapor intrusion pathway did not constitute a concern for the facility, and no further action was required.

It is noted that the soil vapor samples were analyzed for only one SVOC (naphthalene), but that several other SVOCs (in particular, benzo(a)pyrene, benzo(g,h,i)perylene, 2-methylnaphthalene, phenanthrene, and pyrene) were detected in groundwater above corresponding NR MSCs. While it is not possible to do a generic comparison of these data to NR Groundwater Screening Values for the Protection of Indoor Air (Table 2 of PADEP vapor intrusion guidance) due to the presence of SPL in a nearby monitoring well (MW-6), the following rationale is provided to demonstrate that these SVOC concentrations are not of concern for the vapor intrusion pathway. First, these SVOCs are not identified as chemicals of potential indoor air concern (COPIACs) in Table 2 of PADEP vapor intrusion guidance. Further, NR groundwater screening values of "NOC" are provided for 2-methylnaphthalene and phenanthrene, illustrating that these compounds are not of concern because the screening value would be above the compound's water solubility (rendering the pathway incomplete).

Based on the results of the soil gas evaluation conducted as part of the 2007 BER and the fact that the remaining SVOCs detected in groundwater are not COPIACs, it is not expected that vapor intrusion attributable to subsurface contamination at this facility is a potential concern assuming a nonresidential scenario.

Groundwater: The analytical results for groundwater samples collected from five of the eight monitoring wells installed at the site by AES (2007) indicate the presence of several VOCs and SVOCS above the NR MSCs, particularly in the vicinity of MW-6, where SPL has been observed. Depths to groundwater measured in the monitoring wells ranged from approximately 10 feet bgs on the southern end of the property to approximately 20 feet bgs on the northern end of the property. The typical depth to groundwater reportedly was greater than 15 feet bgs (AES, 2007). Groundwater at and in the vicinity of the facility is not used as a potable water source. The Harrisburg Authority mandates that all buildings located within 200 feet of the city water supply be connected. No other potable water supplies (i.e., groundwater) may be used. In addition, the Environmental Covenant for the facility filed in the Dauphin County Courthouse on November 5, 2008 stipulates the following:

- Groundwater at and under the property must not be used for any drinking or agricultural purposes without treatment.
- The property must be used only for non-residential purposes.
- The property owner is responsible to maintain the pavement caps and/or structures overlying the SPL and must not allow any excavations of the approved cap without prior written approval from PADEP (Appendix B: Figure 9 - Areas of Impervious Cover)

Therefore, because the rules and regulations of the Harrisburg Authority mandate use of the public water supply for the facility and surrounding properties, and restrictions on groundwater usage and contact have been stipulated, it is concluded that no further controls are relevant for the groundwater exposure pathway.

It should be noted that prior to 1983, the former waste storage areas (SWMU 1 and SWMU 2) were unpaved. In 1982, prior to the construction of the current structure, drums of TCE stored in this area were discovered to be leaking, and approximately 500 tons of impacted soil was removed and disposed of offsite (ATK, 1989). No other information was located in the regulatory files regarding this release, particularly related to any groundwater investigations.

In 1983, the waste storage areas were constructed which consisted of a roofed and fenced concrete pad. Several floor drains are present within the concrete pad. According to the RFI (1989), the floor drains are underlain by blind sumps (i.e., there are no underground inlet or outlet pipes) to collect any spills. During the site visit, frozen standing water was observed in the floor drains, and the condition of the drains could not be confirmed. There have been no reported

releases at the former waste storage areas, with the exception of the leaking TCE drums discovered in 1982. (Note: In September 2009, PADEP observed numerous uncovered drums of slurry media, grinding waste, and steel shot which were deemed to be immediate hazards, although it was not stated that there was evidence of releases. However, it should be further noted that TCE and PCE were detected above the soil-to-groundwater NR MSCs in two surface (depth of 2 feet bgs) soil samples collected by AES in 2007, suggesting releases have occurred to surface soils in this area.)

No permanent wells monitor the area near or downgradient (east/northeast of the former waste storage areas in the direction of groundwater flow beneath the adjacent property currently owned by the Pennsylvania Department of Transportation) where the TCE-impacted soil was removed. In 2006, LAC collected one soil sample from a depth of 10 to 12 feet bgs and one grab groundwater sample from a temporary well installed near the northeast corner of the waste storage areas (Appendix B: Figure 8 - Soil Sampling Location Map). While trace concentrations of TCE (0.057 mg/kg), PCE (0.019 mg/kg), and cis-1,2-DCE (0.016 mg/kg) were detected in the soil sample below the respective soil-to-groundwater NR MSCs, no VOCs were detected in the grab groundwater sample.

The nearest permanent monitoring well is MW-5, located approximately 225 feet southeast (sidegradient) of the former waste storage areas. Although TCE and vinyl chloride were detected at MW-5 slightly above the NR MSCs (5.2 µg/L and 2.1 µg/L, respectively), it is concluded that the presence of these constituents may be related to a separate source area (TCE exceedances have only been identified in two other site wells, MW-1 and MW-2, located on the southern end of the property) and not related to releases that may have occurred at the former waste storage areas. Furthermore, based on the absence of VOCs and SVOCs in the 2006 groundwater grab sample and the interpreted east/northeast direction of groundwater flow, it is concluded that groundwater in the vicinity of the former waste storage areas is not impacted above risk-based concentrations.

Surface Water/Sediment: The nearest surface water body to the facility is Paxton Creek, located directly east of the main manufacturing building. The interpreted direction of shallow groundwater flow (unconfined) is to the east/northeast toward Paxton Creek. SPL has been identified in MW-6, approximately 85 feet west of the creek bed. However, no SPL has been observed in MW-8 located 29 feet east of MW-6 and approximately 55 feet west of the creek bed.

Several VOCs and SVOCs have been detected above NR MSCs in monitoring wells located along the creek (including MW-3 located on the southeastern corner of the property, and MW-5, MW-6, and MW-8 that monitor the area containing the SPL).

AES conducted fate and transport modeling using SWLOAD5B for compounds requiring further evaluation based on the criteria outlined in the PADEP Technical Guidance Manual (*Land Recycling Program Technical Guidance Manual*, Document Number 253-0300-100, dated June 8, 2002), from which it was concluded that no further modeling (PENTOX) was required, and the groundwater discharge to surface water pathway was incomplete. Therefore, assuming that groundwater flow discharging to Paxton Creek from all areas of concern was evaluated via the fate and transport model, it is concluded that no controls are relevant for the surface water/sediment exposure pathway. As previously discussed, there are no monitoring wells located in the vicinity of the former hazardous waste storage area; therefore, it is unknown whether groundwater is impacted in this area, and if so, if impacted groundwater is migrating beneath the PennDOT property and to Paxton Creek above regulatory standards.

Soil: Soil sampling conducted at the facility in 2006 and 2007 indicated that several VOCs and SVOCs were present above the NR MSCs. Chromium also was detected in soils; however, the samples were analyzed for total chromium and the concentrations compared to the NR MSC for hexavalent chromium. A soil sample later analyzed for hexavalent chromium indicated that detected concentration did not exceed the direct contact NR MSC.

Based on LAC's subsurface soil sampling conducted in 2006, chromium, PCE, benzo(a)anthracene, and chrysene were present above the lower of the soil-to-groundwater NR MSCs (100 times the groundwater MSC) at depths ranging from 10 to 20 feet bgs. Groundwater elevation data from the BER (2007) indicate that these samples may have been influenced by fluctuations in the water table, and therefore, may be more representative of groundwater conditions at the site. Subsequent surface soil sampling conducted by AES indicated that while VOCs and SVOCs were present, none of the concentrations were above the direct contact NR MSCs. Therefore, no controls are relevant for the surface or subsurface soil exposure pathways. As described above, an Environmental Covenant was recorded for the facility that restricts disturbance of the pavement cap/structures particularly near the location of the SPL without prior written approval from PADEP (Appendix B: Figure 9 - Areas of Impervious Cover).

E. Follow-up Action Items

USEPA Region III will decide if additional information or sampling at the facility is required to determine whether or not the environmental indicators have been met or if corrective action is required for the facility.